

MINING WORLD



in this issue
**Inland Steel's
Underground Conveyors**
Page 30

DECEMBER, 1951

Vol. 13 No. 13

35 cents a copy
in Sterling, 3s

For Trackless Mining—

Simco Crawler Rocker Shovels provide lowest cost, high speed, dependable loading.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturer of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

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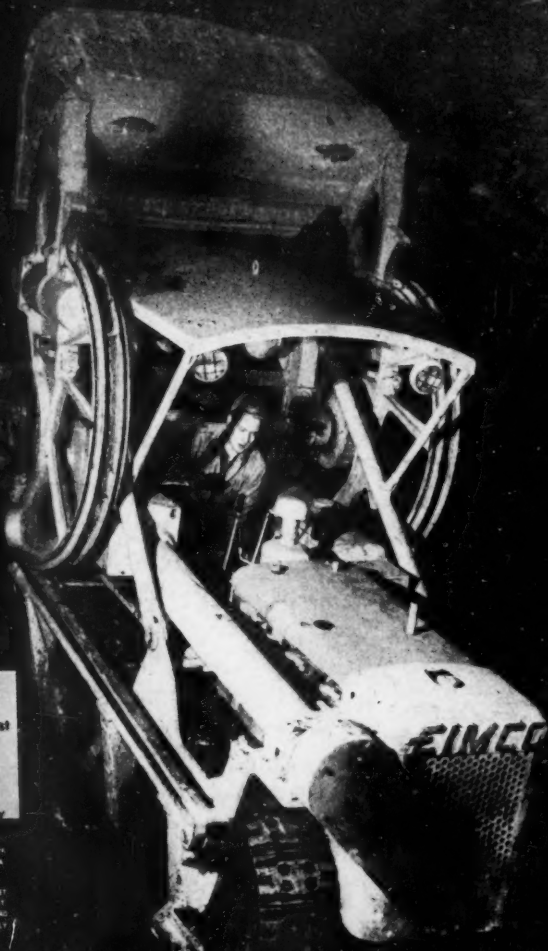
EL PASO, TEXAS: MILLS BUILDING • BERKELEY, CALIFORNIA: P. O. BOX 240

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AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD



"EUCS"

Are Your
Best Bet!

FOR BIG LOADS

FOR LONG HAULS



FOR SHORT HAULS

FOR LASTING STRENGTH



Because of their rugged construction and dependable performance, Rear-Dump Euclids are standard equipment on hundreds of mine, quarry, and construction jobs. For moving rock, ore, overburden and other heavy excavation, "Eucs" have the capacity and speed to haul bigger loads faster and at lower cost per ton or yard moved.

Look at the record! Of the thousands built, nine out of eleven Euclids are still in use today! They're job proved...have earned their

reputation for staying power, low-cost production and efficient operation on a wide range of work.

Owners know from experience that they can depend on prompt, efficient service from Euclid's world-wide distributor organization.

Euclids are your best bet for more loads per hour and more profit per load. Write for information on the complete line of Euclid equipment, or call your Euclid Distributor today.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

EUCLIDS



Move the Earth



Team for fast loading



LOOK UNDER THE HIDE

Connecting rods for "Caterpillar" Diesels are made of medium carbon steel, drop forged and heat treated. Of "H" section design, they are rifle drilled to provide oil passage to the piston pin, and to oil-cool the piston. Connecting rods are balanced to close limits. Crankpin bearings are solid aluminum alloy, precision type. Piston-pin bushings are bronze and are precision bored. Look under the hide for built-in quality.

TIME saved is indeed money earned when the job is loading pay material. Time-saving is biggest when you have power that not only works fast but works steadily . . . for down-time, on the other hand, can easily turn savings into losses. The loss doubles when the job requires a team of interdependent machines — for when one goes down the other becomes inactive too.

The Federal Chemical Company (Tennessee) minimizes such happenings by using dependable power: "Caterpillar" Diesel. For loading phosphate rock from a 2-acre storage pile onto railroad cars (see picture), a "Caterpillar" D7 Tractor 'dozes the material to a drag-line powered with a "Cat" D13000 Engine. An average of 112 ton-yards keeps piling into 50-ton railroad hopper cars per hour. Outstanding operating advantages, according to Federal's Tom S. Miller, are speed and very little down-time. "'Caterpillar'-powered equipment," he adds, "fills the bill best for us under the trying conditions of phosphate mining."

Leading manufacturers of all types of mining and excavating equipment have engineered their machines to be powered by "Caterpillar" Diesels. You can standardize on power by specifying "Caterpillar" Engines on your machinery purchase order.

Today the importance of "Caterpillar" products, both for military use and for maintaining the national economy, is greatly increased. Talk over your machinery requirements with your "Caterpillar" dealer. He has ample parts stocks to keep your present equipment doing its job and will do his utmost to make prompt delivery of new machines.

CATERPILLAR

DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

CATERPILLAR, PEORIA, ILLINOIS



Ready for extra-ordinary service and easier warehousing. These Liddicoat Rock Bits will follow millions of others to many of the world's outstanding mining and contracting concerns operating in the 11 western states, Alaska, Mexico and the Philippines.

LIDDICOAT detachable rock bits are not ordinary in any sense of the word. Many outstanding features of manufacturing and processing of the fast-drilling LIDDICOAT bit add to its dominant position in the mining and contracting fields.

LIDDICOAT bits are used to destruction . . . no resharpening. This alone is an extra, out of the ordinary feature providing excellent performance and service. LIDDICOAT eliminates costly labor and equipment necessary for re-sharpening, heat-treating and transporting.

LIDDICOAT bits are designed to give fast-cutting performance and long-cutting life at a low initial cost per bit and lowest cost per foot of hole drilled. Add to this, special LIDDICOAT strength and superiority of attachment, consistency and hardness of the specially rolled steel which is forged into tough bits, and you have many of the extra ordinary features of LIDDICOAT, the fast-drilling detachable rock bit.

Put that extra quality to work in your drilling operations and you too will join the ever-expanding list of the world's leading mining and contracting concerns who are now satisfied LIDDICOAT customers.

PILOT CONSTRUCTION



Section "A", along the high-center wings. Section "BB", along the low-center wings.

WESTERN

Rock Bit Manufacturing Company

552 West 7th South

• Salt Lake City 4, Utah

"EVERY LITTLE BIT COUNTS"

MINING WORLD, December, 1951. Volume 13 No. 13. Published monthly, except April when publication is semi-monthly, at Emmett St., Bristol, Conn. Executive, advertising and editorial offices, 121 Second St., San Francisco 5, California. Subscription in United States, North, Central and South America, \$3.00 per year; other countries, \$4.00 per year. Entered as second class matter Oct. 10, 1951 at the Post Office at Bristol, Conn., under the act of March 3, 1879. Postmaster: please send notice 3579 to MINING WORLD, 71 Columbia St., Seattle 4, Washington.



EXCLUSIVE

*Roll Type Throttle
Control*

EXCLUSIVE

*Push Button Air
Bleeder Valve*

EXCLUSIVE

*Cylinder Mounting for
Positive Safety . . .
Longer Service Life*

NEW

Thor

SINKER LEG

45% MORE FOOTAGE AT FAR LESS COST!

Here's real savings in labor . . . man hours . . . and drilling costs . . . and 45% more drilling footage by actual tests!

The miner can carry the entire setup—Thor Sinker and Thor Leg—into the smallest tunnel or closest corner, set it up in an instant, start the hole . . . and then let Thor do the work! All he does is control the *constant pressure* feed by operating two simple throttles—the *only automatic controls in leg operation!*

Think of the savings . . . both in operating costs and air consumption. With carbide bits the Thor Leg can replace drifters—and heavy mountings on scores of heavy duty operations . . . can drift in tunnels where drifters won't fit. Write today for catalog data.



FULLY AUTOMATIC—A quick, easy setup—just start the hole—set the leg at any angle between 30 and 45 degrees . . . the leg does all the lifting—all the constant pressure feeding . . . control the feed with a turn of the wrist!

INDEPENDENT PNEUMATIC TOOL COMPANY
AURORA, ILLINOIS

Thor **PORTABLE POWER**
TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS
DECEMBER, 1951

{World Mining Section—3}

World's Largest Molybdenum Mine

is the striking setting for this new Lorain 50-I shovel. This Climax, Colorado pit produces 90% of the world's supply of molybdenum, so vital in today's production of steels.

Tough rock digging — and lots of it — is a specialty of this 1-yard Lorain-50 because it is equipped with a shock-absorbing, hydraulic (fluid) coupling that offers many advantages for easy operation, increased production and longer life. It is the only 1-yd. shovel available with this feature as standard equipment! The Lorain-50 story is worth checking with your Thew-Lorain

Distributor — to boost production and cut costs in your mine or pit!

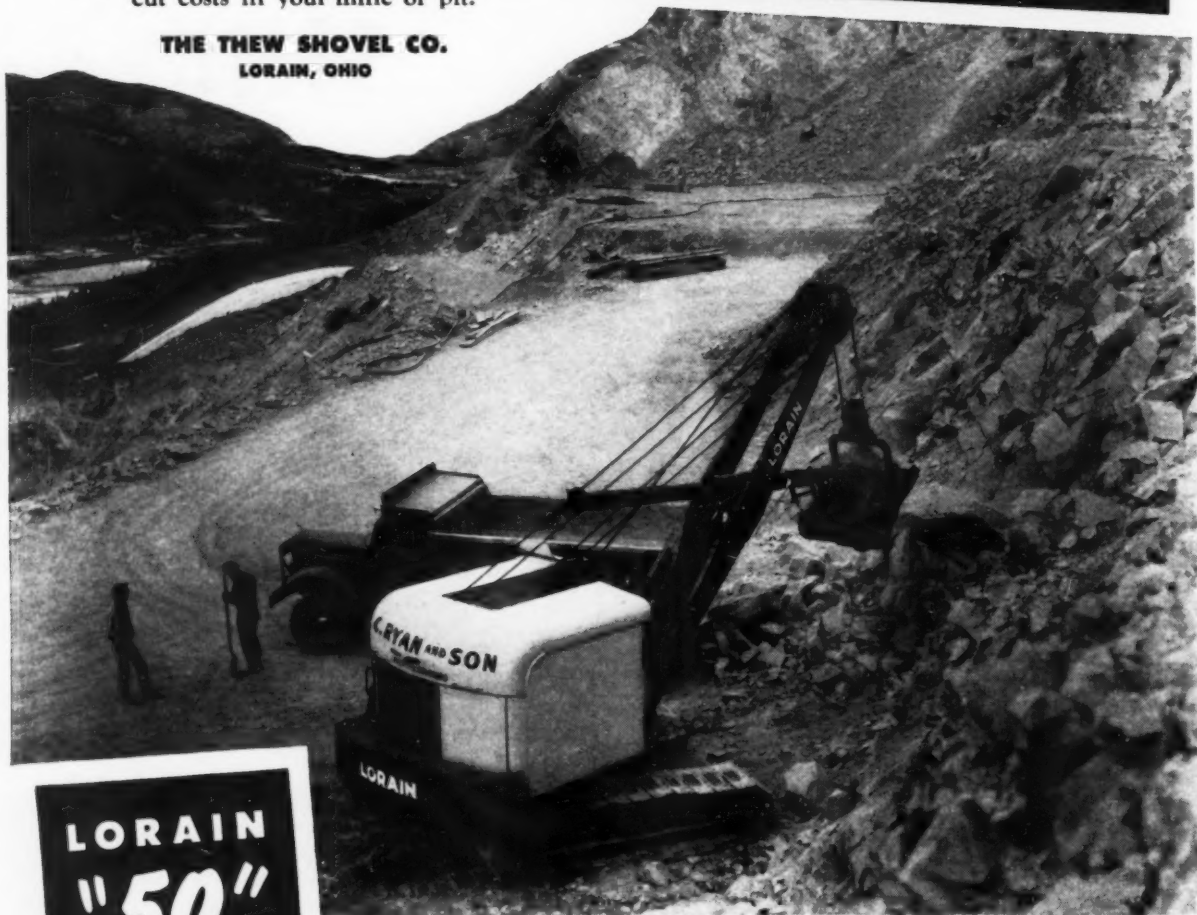
THE THEW SHOVEL CO.
LORAIN, OHIO

LORAIN "50"

WITH HYDRAULIC COUPLING

LICKS ROUGH-TOUGH
DIGGING

at Climax, Colorado Pit



**LORAIN
"50"
FEATURES**

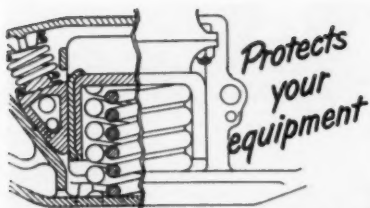
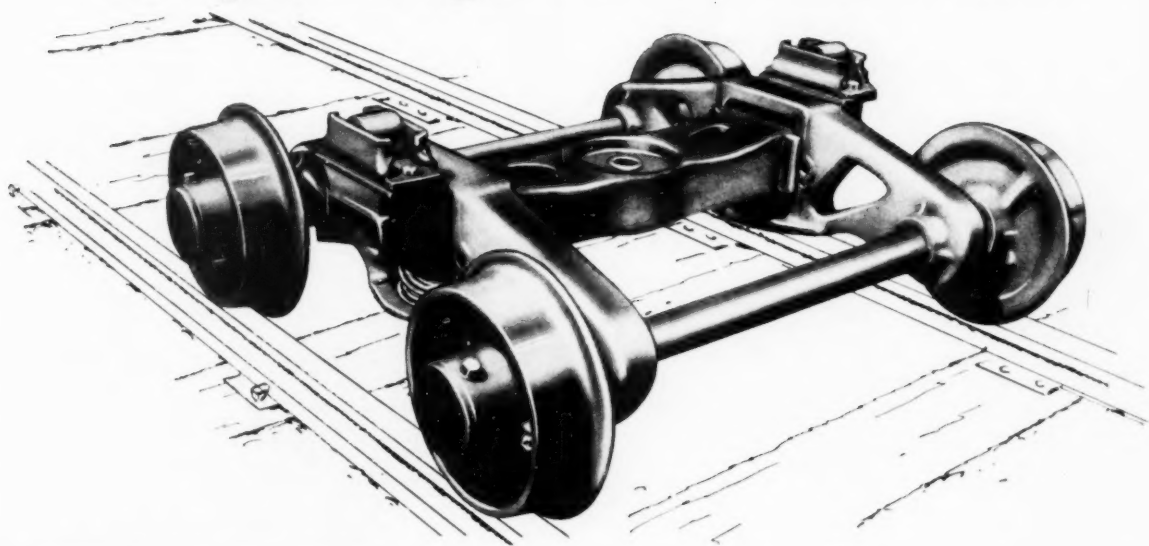
- Hydraulic Coupling Power Take-Off — digging power "hangs on" — cushions shocks
- Air Controls for Steering and Tread Lock — from operator's cab in any swing position
- One-Piece Cast Steel Turntable Bed — extra strength; revolves on anti-friction bearings
- Choice of 6 Mountings — 3 crawler lengths in 2 widths; also on rubber-tires

THEW **LORAIN**®
on CRAWLER or RUBBER



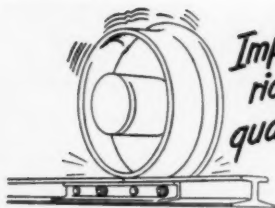
SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

Specify **NATIONAL NC-1** trucks for your large 8-wheel mine cars



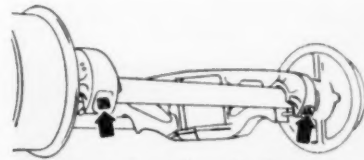
*Protects
your
equipment*

Shock-absorbing system of the NC-1 truck is similar to designs of the American Association of Railroads for full-size freight car trucks. The oscillation control mechanism (see cutaway) floats your loads over the tracks.



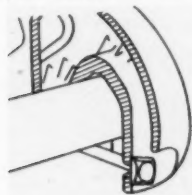
*Improves
riding
quality*

Track irregularities are no hindrance to higher speeds for mine cars when they are equipped with National NC-1 trucks. Truck design and large diameter, low stressed, load-carrying springs improve riding qualities.



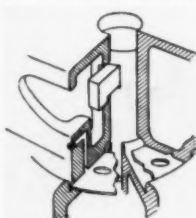
Quick wheel change

Removal of bolt at each end of side frame permits quick wheel and axle assembly change. Cuts repair time and costs . . . keeps cars in operation longer. No lengthy tie-ups for wheel and axle changes on a National NC-1 truck.



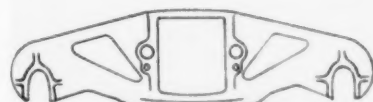
*Keeps
itself in
alignment*

The NC-1 truck stays square automatically. V-shaped slots over the axles make it impossible for the truck to get out of square without lifting entire weight of the car body and lading—means longer service, less repairs.



*Large
center
bearing*

National NC-1 truck's large center bearing provides maximum wear life by reducing per-square-inch loading . . . provides bolster stability. Has easily replaceable centerplate shims and adequate provision for lubrication.



Integral design

Side frame and bolster are each of one-piece, integrally cast construction similar to the National C-1 trucks used on railroads. Gives maximum strength, minimum weight—has no welds or rivets to shake loose.

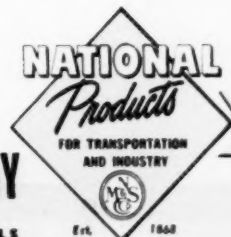
A-3920

For minimum maintenance time and spillage, plus maximum equipment protection—specify National NC-1 trucks on your next 8-wheel mine car order.

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

WILLISON AUTOMATIC COUPLERS • DRAFT GEARS • NACO STEEL WHEELS



NEW



GET THE DETAILS FROM

MARION 191-M • 10 cu. yds.
World's Biggest Shovel For
LOADING BIG HAULAGE UNITS



WARD-LEONARD
Electric OR
DIESEL ELECTRIC

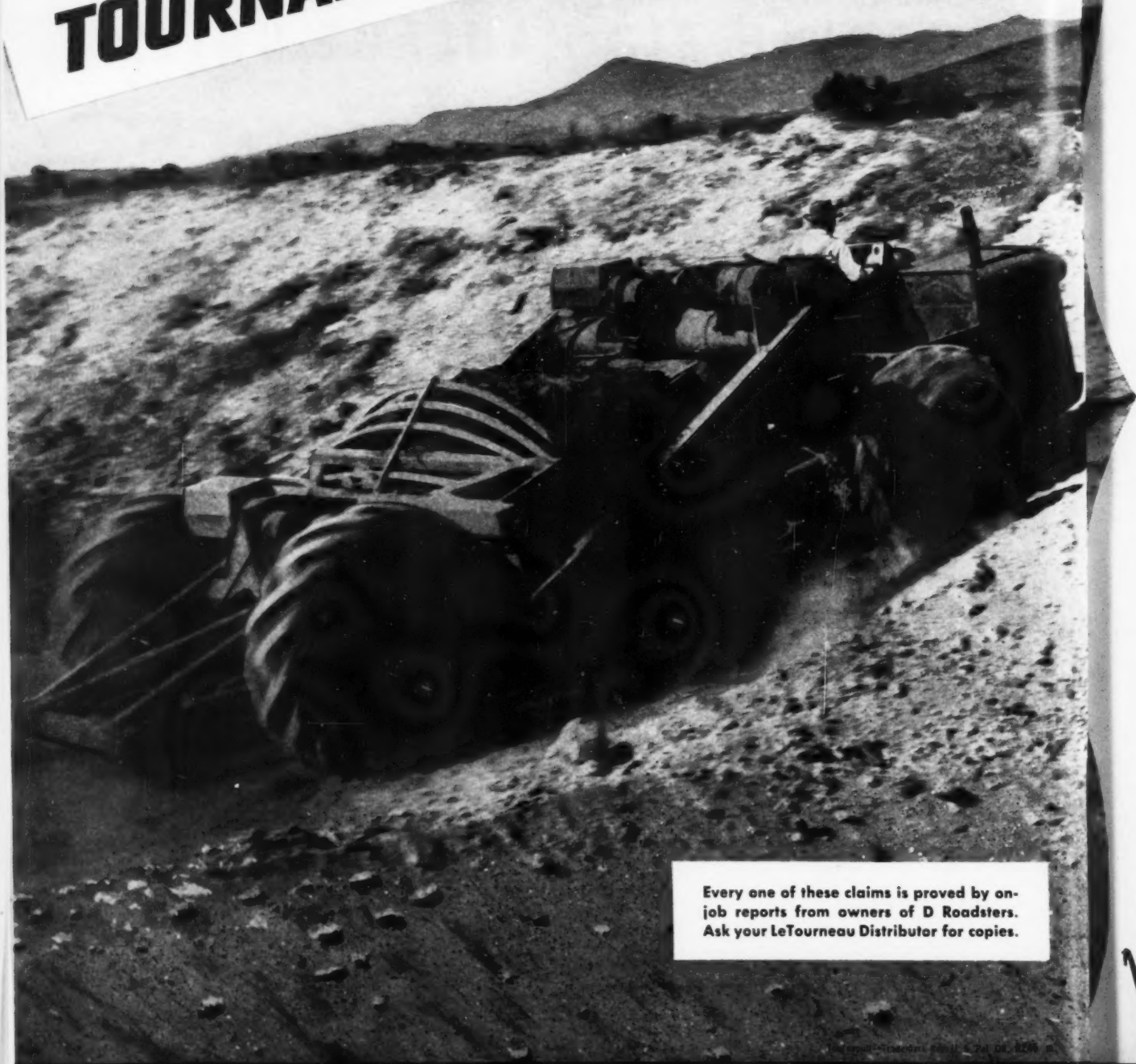
MARION

POWER SHOVEL COMPANY
MARION, OHIO, U. S. A.

YOUR NEAREST **MARION** OFFICE

Check these reasons why
D Roadster
TOURNAPULL

gets more work



Every one of these claims is proved by on-job reports from owners of D Roadsters. Ask your LeTourneau Distributor for copies.

R. G. LeTourneau, Inc.
PEORIA, ILLINOIS

done at a lower net cost per job

① Modern rubber-tired speeds for fast digging and quick moves

This fast-stepping unit has a top speed of 28 m.p.h. You shift gears fast through the 5-speed, heavy-duty, sliding-gear transmission; has positive electric steer for accurate control and snappy maneuvering. You get

big, fast tires instead of a crawler's tracks. With "D's" 28 m.p.h. speed, you get production and cost advantages on both long or short hauls as well as on odd-job maintenance and production dirtmoving assignments.

② Less downtime for weather, less slowdown for soft and slippery going

Big, low-pressure tires improve traction. Two-wheel prime mover wastes no tractive weight on extra steering wheels. Power-proportioning differential applies up to 4 times

more power on wheel having firmest footing. Positive power steer shifts footing as needed for a better pull. All these speed up work cycles, cut downtime for bad weather.

③ Easier to keep busy, handles odd jobs or production dirtmoving

7-yard D Roadster is ready to go anytime at 28 m.p.h. to handle scattered one-machine jobs such as back-sloping, clearing slides and other small-yardage jobs. It's an excellent one-man road gang, can load and haul in surfacing, spread it to finished grade. Handy for drainage service too, and for clean-up at the mine. Tournapull is also an effective

big-yardage dirtmover when pusher-loaded in fleet operation. This flexibility gives you more effective use of manpower and equipment for your maintenance, construction, and stripping operations. Both a Snow Plow and Bulldozer blade increase year-round application and make it best all-around production tool in your equipment inventory.

④ You save on job-to-job travel over pavement . . . cross country

Your operator drives the Roadster job-to-job over the highway under its own power (and carrying its own supplies). This saves cost of loading, blocking, trucking, low-boy, unloading, plus wasted waiting time. In addition, because the "D" can work-and-run to another one-machine assignment any time, any place,

you can speed up maintenance service anywhere in adjoining pits . . . anytime of year. 25 miles is only about an hour away. Unlike crawler's tracks, big rubber tires do not damage road surface . . . they can also travel along or across tracks, over tressels, taking shortest route on jobs and between jobs.

⑤ Faster, easier to operate . . . less fatigue

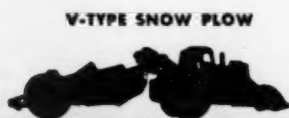
Good operators are always available for the D Roadster. Push-button electric control makes it faster and easier to control. Big, low-pressure tires, air foam cushioned seat, plus quieter operation eliminate a lot of operator fatigue. This makes for safer, faster,

steadier operation, less manpower turn-over. These advantages plus better operator co-operation mean a substantial increase in yards moved and more work completed throughout the year. Contact your LeTourneau Distributor for all the facts . . . there's no obligation.

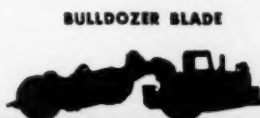
Attachments and interchangeable EQUIPMENT:



7-TON CRANE



V-TYPE SNOW PLOW



BULLDOZER BLADE



7-TON REAR-DUMP

Send for complete facts to: R. G. LeTOURNEAU, INC., Peoria, Illinois

Rush ☐ Specifications ☐ Price ☐ Job performance reports on 7-yd., 28 m.p.h. D Tournapull

Name..... Title.....

Company.....

City..... State.....

Am also interested in "D" with: ☐ V-Type Snow Plow ☐ Bulldozer attachment ☐ Rear-Dump Hauler ☐ 7-ton Crane



HARD to understand but EASY to appreciate

Most people have to see the Pacific RTC at work to understand quickly *how* it operates. The secret is in the patented sheave with its sprocket-like bottom flange. Connecting chains drop down between sprocket teeth to pass unit. Main inhaul and backhaul cables remain engaged at all times. U.S.A. ★ FOREIGN PATENTS APPLIED FOR.

Everyone easily appreciates the advantages of RTC. Helps you make more money by getting out more ore. *Eliminates* double-slushing. Reduces setup time. Reduces costs. Thoroughly field-tested. Light, portable, easily installed in timbered or hard rock operations. Write for complete information.



SLUSHING

Model illustrated operates with double-drum hoists up to 20 H.P. For best results use Pacific "Slushmaster" or Pacific Drag Scrapers up to 42 inches in width.

ROUND THE CORNER WITH A SINGLE SETUP

ALLOY STEEL & METALS CO.

INHAUL

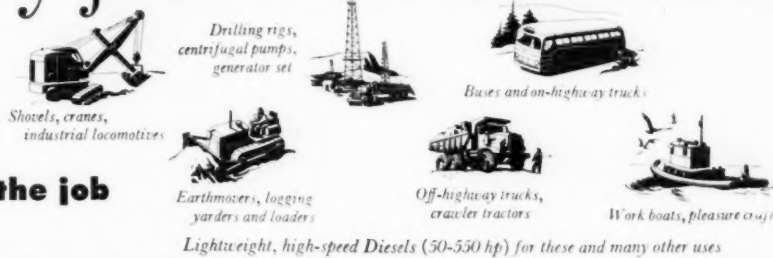
1862 E. 55th St., Los Angeles 58, California
Mailing Address: Box 15323 Vernon Station, Los Angeles 58, Calif.

BE SPECIFIC — ORDER PACIFIC — Jaw Crushers, "Slushmaster" Scrapers, Sheave Blocks, Sheave Anchors, Bit Knockers and Pacific Wearing Parts.

Cummins Diesels do so many jobs—so much better

...because they're

custom-built to fit the job



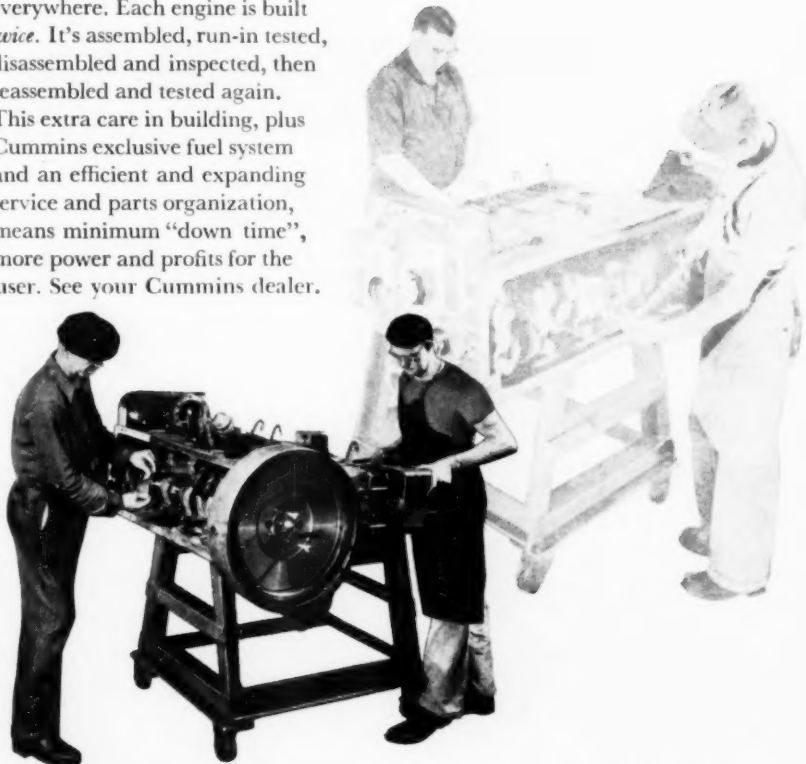
...because they're

*BUILT
NOT
ONCE
BUT
TWICE*

Rugged, lightweight, high-speed Cummins Diesels are at work everywhere. Each engine is built twice. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. This extra care in building, plus Cummins exclusive fuel system and an efficient and expanding service and parts organization, means minimum "down time", more power and profits for the user. See your Cummins dealer.



**Diesel power by
CUMMINS**



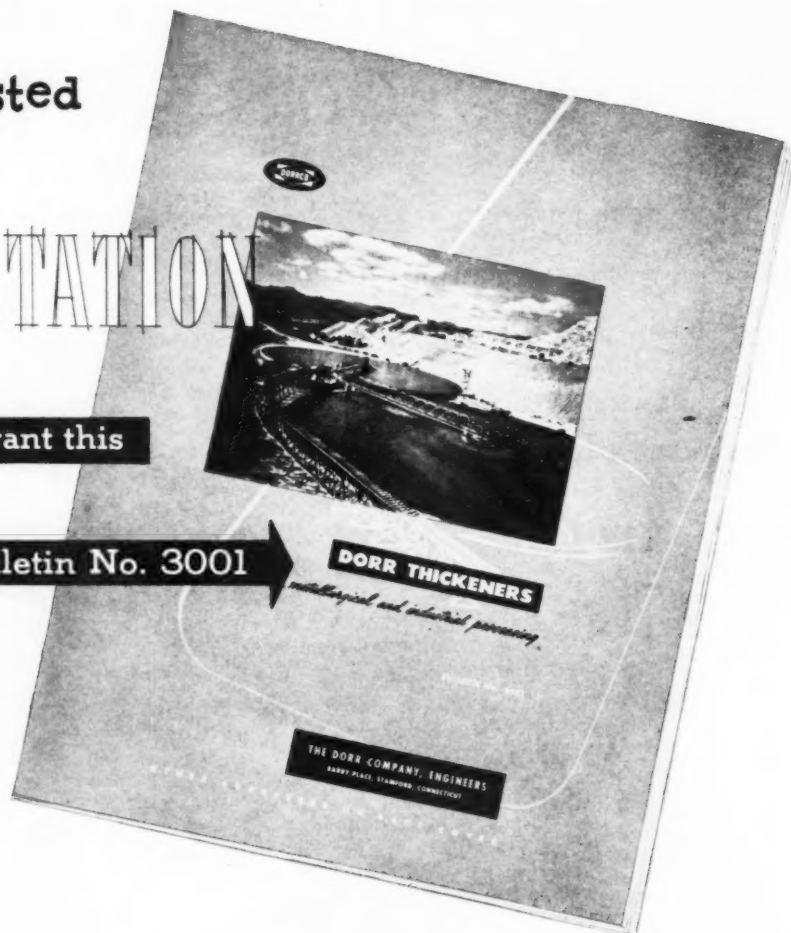
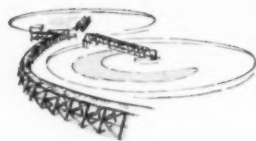
CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA
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you're
interested
in
SEDIMENTATION

you'll want this

new bulletin No. 3001



Bulletin #3001, "Dorr Thickeners for chemical, metallurgical and industrial processing" has just come off the press. Containing 28 pages of descriptions, drawings and photographs, it covers the comprehensive line of Dorr Thickeners briefly and factually. If you're concerned with thickening problems and the equipment with which to solve them, you'll find it helpful. Write for your free copy today.



WORLD - WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in the principal cities of the world

USE "SYMONS" SCREENS ALL THE WAY...

from PRIMARY SCALPING on
through the FINER SEPARATIONS

For sizing operations, Nordberg offers a broad line of "SYMONS" Vibrating Screens from Heavy Duty Grizzlies for scalping through a wide range of types and sizes to meet practically every problem. Here are the "highlights" of the units illustrated:

"SYMONS" Vibrating Bar Grizzly ... for scalping coarse materials, designed to assure non-clogging action with big capacity.

"SYMONS" Rod Deck Screen ... employs a highly efficient screen deck, utilizing individual replaceable spring steel rods. Features low screening cost—big capacity—low maintenance—long life—ideal for moist and sticky materials.

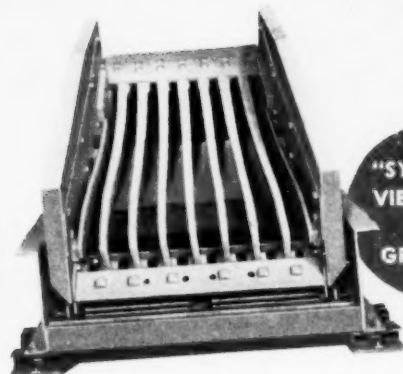
"SYMONS" Horizontal Screen ... unsurpassed for accurate sizing of stone, gravel, slag, coal and ores. (Fully enclosed units available for efficient "hot plant" asphalt operations). Built in a variety of deck combinations, permitting a wide range of sizes to be handled.

"SYMONS" "V" Screen—the newest addition to the proven and popular line of "SYMONS" Screens—for extremely fine—single cut wet or dry separations. An entirely new principle of screening—employing controlled diffused feed—and vertical flow of material—with low speed rotary and high speed gyratory action.

Write for descriptive literature covering the type of unit in which you are interested.

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN

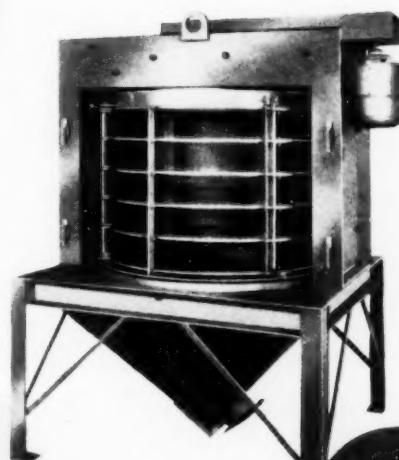
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"SYMONS"
VIBRATING
BAR
GRIZZLIES



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ROD DECK
SCREENS



"SYMONS"
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SCREENS

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HORIZONTAL
SCREENS



"SYMONS" ... a Nordberg trademark
known throughout the world

S251

NORDBERG

*Machinery for processing
ores and
industrial minerals*



"SYMONS"
PRIMARY
CRUSHERS



"SYMONS"
CONE
CRUSHERS



ROTARY
KILNS



GRINDING MILLS



MINE HOISTS



DIESEL ENGINES

JOY SLUSHERS



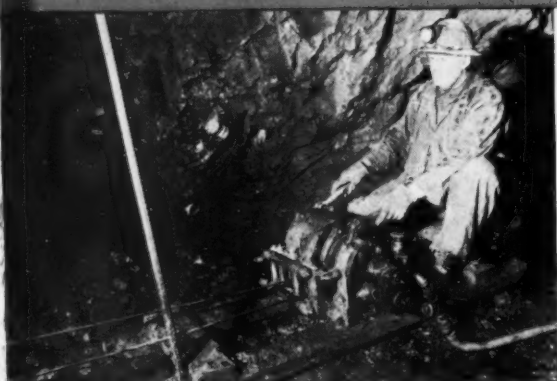
Joy AAF-211 double-drum slusher, powered by 15 H.P. electric motor, in operation in a western copper mine, scraping into a grizzly.



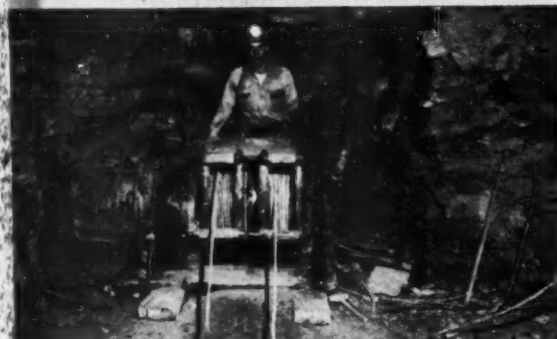
Joy E-111 Turbinair single-drum hoist on a timber setting operation in a large western mine.

Joy HL-3 Shovel Loader mucking out a drift round in a western copper mine.

Built with **JOY'S** intimate knowledge of mining problems...they're scraping millions of tons of muck every year



Turbine driven 5 H.P. S-211 slusher scraping ore in a stope in a western fluorspar mine.



Electric driven CFA-211 double-drum slusher in operation in a Tennessee zinc mine.



25 H.P. B-312 electric slusher scraping ore in a large western Canadian mine.

Ruggedly built to stay underground longer, JOY Slushers stand up under the heaviest loads and toughest conditions to give you that high efficiency found only in machines which are *designed* for the job and *proved* in the mine. Check these features: they assure more tonnage scraped per shift and longer life with less maintenance.

- 1 Anti-backlash brakes
- 2 Positive direct lubrication
- 3 Shield-type anti-friction bearings
- 4 Wide choice of pulling and tail-rope speeds
- 5 Universal rope guides and rope guards
- 6 Cast steel skid-type frames
- 7 Large drum diameters
- 8 Easily removable clutch bands
- 9 Simple clutch adjustment
- 10 Gearing enclosed for protection from dirt and dripping water

● There's a JOY Slusher in a size and type for every scraping job. You need only to consult a Joy Engineer to get your answer. He can recommend the best loading equipment for your needs because Joy manufactures the only *complete* line of rock loading equipment for mines . . . slushers, track-mounted shovel loaders, and continuous-type trackless loaders.

WRITE FOR BULLETIN 76-Y

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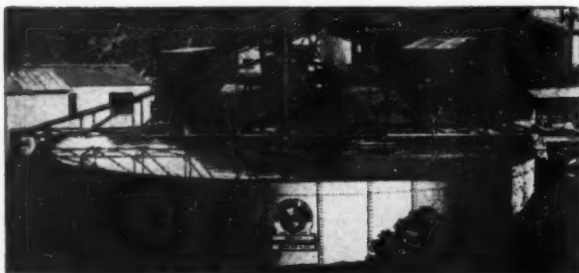
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Dear Sir:

I have changed address as indicated below. I am still senior partner of Empresa Minera Porco Ltda., Potosi, Bolivia, but spend half my time here. I find *World Mining* very interesting and useful.

A. W. Milligan
Magdalena del Mar
Lima, Peru.

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Dear Sir:

I am receiving *Mining World* regularly and I shall be glad to continue reading it.

All my acquaintances are now reading the magazine. I find the information extremely interesting and the mining districts in which I am interested are adequately covered.

K. C. G. Heath
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South Africa, Limited
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England.

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Dear Sir:

Your publication is very interesting to us. The following affiliated company should like to receive *World Mining*:
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Dear Sir:

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Condensed Form Very Efficient

Dear Sir:

Several years ago while still in Holland I read some numbers of your publication *World Mining*.

Very recently I again saw a copy of your magazine at one of our plants and finding the condensed form of reporting the International mining news very efficient I would again like to read it.

For your information it may be stated that "Surinaamsche Bauxite Maatschappij" is a fully owned subsidiary of Aluminum Company of America and the main foreign source for its bauxite, incorporated in Dutch Guiana.

W. A. Coster, Chief Engineer
Surinaamsche Bauxite Maatschappij
Waterkant 28
Paramaribo, Dutch Guiana.

Thanks From Norway

Dear Sir:

Many thanks for your publication. I find it of the greatest interest.

Mikal Stetthaug
Slating Engineer
Norwegian State for Finmark
Norway.

I am in regular receipt of *World Mining*. It is very interesting. I appreciate receiving it.

E. B. Mollbach
Ingenior M. N. I. F.
Hauge i Dalane
Norway.

MINING WORLD

and the export edition

WORLD MINING

A Miller Freeman Publication

Published monthly except in April when publication is semi-monthly

DECEMBER, 1951

Vol. 13

No. 13

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COVER CIRCLE: Sherwood mine of Inland Steel Company at Iron River, Michigan, where five belt conveyors transport iron ore from stopes to shaft.

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DRIFTS AND CROSSCUTS

\$60.00-A-Year Reader

This and every issue of *Mining World* reaches mining camps in all parts of the world—wherever minerals are mined, milled, smelted and refined. It is regularly read in Akiak, Chicken, Paradise, Rescue, Hog Heaven, Travelers Rest and Dripping Springs. Quite evident is the fact that it is read by miners in Platinum, Cobalt, Vanadium and a variety of Silver Cities, Gold Fields, and Iron-ton.

However, the Editors feel that you would be interested in knowing that as this issue is read by a Utah uranium miner or a California chrome miner it is being read at the same time by a manganese miner in Africa's Belgian Congo.

The other 109 readers of *Mining World-World Mining* in the Congo must wait some six weeks for their regular "Sea Mail" copies to reach them.

Depending on the weight of the magazine and the day of the week, to take full advantage of regularly scheduled flights, either air express or air mail is used to speed it to Africa. Here is how the copy reaches the extreme southern end of the Congo in five days. One of the first copies off the press is picked up by Air Express International who takes care of routing the shipment. A typical flight schedule is as follows: Shipped from San Francisco on Monday evening on a United Airlines DC-4 Cargo Liner. Transferred to a Pan American World Airways Constellation at New York early Tuesday morning. Leaves New York at 9:30 a.m. Tuesday, arriving at Leopoldville, Belgian Congo at 9:15 a.m. on Thursday. Ordinarily a wait until 8:00 a.m. Friday would be necessary before the Sabena Belgian Airlines would leave for Elizabethville. The DC-3 arrives there at 4:15 p.m.

While the average reader pays only \$3.00 per year to have a copy delivered to his mine, the air-borne copy for the Belgian Congo costs \$60.00 per year. A single copy of the October issue was air-mailed at a cost of \$6.00.

Manganese production is being increased in the Congo. United States equipment and methods have played an important part in making this production possible. The Editors hope that ideas gained by reading *Mining World* will speed the increase.

COMING CONVENTIONS

Nov. 30 and Dec. 1, 1951. 57th Annual Convention NORTHWEST MINING ASSOCIATION, Davenport Hotel, Spokane, Washington.

January 17 through 19, 1952. Annual Convention NEW MEXICO MINERS & PROSPECTORS ASSOCIATION, Carlsbad, New Mexico.

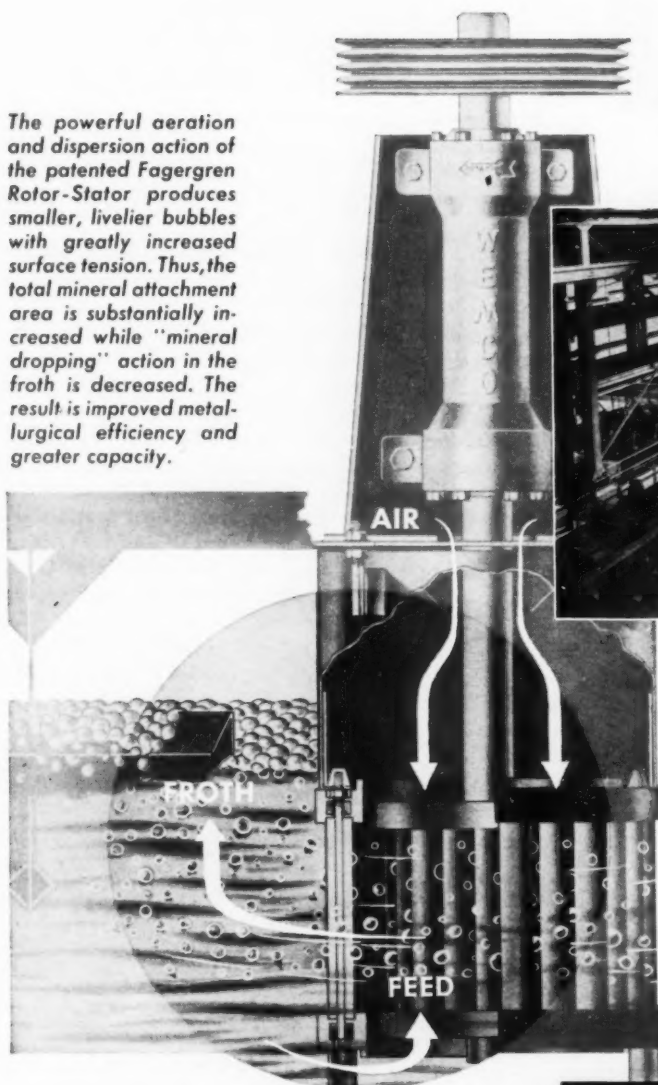
January 31, February 1 and 2, 1952. Domestic Mining Convention in conjunction with the Annual Convention of the COLORADO MINING ASSOCIATION, Shirley Savoy Hotel, Denver, Colorado.

February 18 through 21, 1952. Annual Meeting of the AIME, Hotel Statler, New York, New York.

April 21 through 23, 1952. Diamond Drilling Symposium arranged by the Chemical, Metallurgical and Mining Society of South Africa and the Diamond Research Laboratory, Johannesburg, Union of South Africa.

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CAPITOL CONCENTRATES

Foreign Metal Miners Not Much Interested In Shipping To USA

Foreign suppliers of lead to the United States, especially Mexico, have not been taking on new business with users in this country at the OPS ceiling because they still can get and are getting 21.5 and 22.0 cents per pound for their output from European buyers who were their normal pre-World War II customers.

The American Smelting and Refining Company announced that its average sales price for Mexican lead was 21.33 cents per pound at the Monterrey, Mexico, refinery for the week ending October 27. This price compared with an average of 21.30 cents a pound received in the previous week.

The import situation is further complicated because Congress recessed without taking action on the bills which would have suspended tariffs on both lead and zinc until March 31, 1953. Therefore, domestic buyers must pay the 1-1/16 cents a pound lead duty and the 0.7 of a cent zinc import tariff. Thus they are not getting the metal.

The foreign metal supply situation continues to be aggravated by the dockworkers' strike at New York. It is reported that supplies of copper held up in the harbor as of early November totaled over 20,000 tons and that the amount would be swelled to 25,000 tons in the following week. A Norwegian steamer with 60 tons of much-needed nickel turned back to Norway without unloading. Another ship carrying several hundred tons of lead went back to Mexico with the metal still in the hold.

There seems to be plenty of reason for speed in getting new domestic sources of metal ready for production, but there is still mighty little that can be interpreted as action.

• Forbes To Head U. S. Bureau of Mines

The President has appointed John J. Forbes, chief of the Bureau's Health and Safety Division as the new director of the Bureau. He is a long time employee and has much experience in coal mining and mine safety work. The importance of the Bureau's most important function—saving lives—is once again manifest by this appointment.

Many western metal miners were disappointed that the new director has had so little experience with western operations and metallic mining. Others were quick to point out that this was of lesser importance, now that the Defense Materials Procurement Agency is functioning and has taken over many of the Bureau's former mineral defense programs.

• Arizona Manganese Producers Are Waiting

Although there are many potential producers of manganese ores in Arizona, they are still waiting for some information as to where they can market their product and thus contribute their bit to the defense program. Although it was announced some months ago that there would be a buying station in Deming, New Mexico, it is now reported that it will be several months before the Deming plant can take ores. The latest rumor is that the water supply at Deming has been found to be insufficient and that GSA is thinking of changing the location of the plant to El Paso, Texas.

Even Deming was a deterrent to Arizona producers

because of high freight rates and the fact that much of Arizona's potential production lies in the west-central part of the state. El Paso rates would be much worse. If Arizona mines are to contribute their manganese, it would seem necessary to have a buying station within reasonable access.

As things stand right now it looks like the GSA manganese program will be more of a "flop" than the one for tungsten. Government announcements said the program was designed "to encourage the discovery, development and production of manganese in the United States." However, J. Carson Adkerson, president of the American Manganese Producers Association, commented recently that the plan "will supply at the most only about two per cent of our annual consumption."

• Aluminum Substitution For Copper Urged

Defense Production Chief Manly Fleischmann is persistently urging the substitution of aluminum for copper in manufactured products. He is optimistic regarding the government-sponsored and financed aluminum expansion program. "We are very near the present expansion goal for that metal," he said, "and I am wondering whether we should not raise our goal."

The aluminum goal is a supply of 1,528,000 short tons of the light metal by the end of 1952 and also calls for a further expansion of 347,000 tons in production capacity for the following year. There are other projects in the blue-print stage which call for still further production of aluminum.

"One of the best reasons for expanding aluminum capacity," Fleischmann stated, "is to permit a greater use of the light metal as a substitute for copper." He explained that copper is the worst long-range problem faced by DPA. "Its production cannot be expanded quickly," he said, "so if I were a manufacturer I would try to use aluminum as a substitute."

Meanwhile the copper-producing areas, and the states in which copper production is a major industry, are wondering whether or not there will be any such enthusiasm for converting industry back to copper use when the present emergency is over. They are concerned over what the enormous government-developed aluminum production capacity is going to do to the future of the copper industry. No such government-sponsored effort is even available for expansion of domestic copper production.

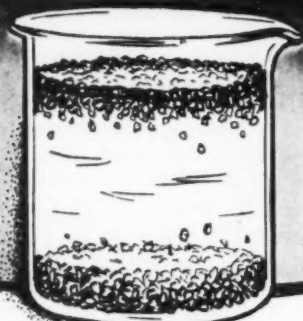
Especially significant is the recent announcement that Anaconda Copper Mining Company is going into the aluminum business on a large scale by taking over the Harvey Machine Company commitments near Kalispell, Montana. It is a \$40,000,000 project which will produce 54,000 tons of aluminum ingots a year. Thus the copper miners are starting into competition with the big three of aluminum: the Aluminum Company of America, Kaiser Aluminum and Chemical Corporation, and Reynolds Aluminum Company.

• Some Statements Were Inconsistent

Administrator Larson of the Defense Materials Procurement Agency delivered a speech at the recent western mining convention in Los Angeles. While in a pleasant enough vein, it was not notable for furnishing facts and information which the mining industry did not already know. Although slightly apologetic in tone, Larson's

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speech still made some interesting statements, if one reads between the lines.

For instance, he stated that DMPA receives its line of authority directly from the Office of Defense Mobilization, and that it has both "central responsibility and authority." If so, why does the actual approval of defense loans for mining have to be given by the Defense Production Authority? At present, Larson can merely recommend.

He also stated that DMPA is responsible for making subsidy payments, authorized by the Defense Production Act, "which may be necessary to maintain essential production." Further along he warned that we must not put into operation high-cost domestic mines which cannot be sustained in normal periods, lest we dislocate the economy. On the other hand, Larson was not so concerned about dislocating the economies of foreign nations, as he recommended stimulating production in "other areas of the free world." While no objection to this proposal has been voiced it is known that foreign production will have to be subsidized by one means or another, and over long periods. One treatment for foreign and another for domestic operators can not meet with the approval of American miners.

If, as Larson said, he and the mining industry are in business together, both of them had better watch closely their silent partners in the other agencies and unload them if at all possible.

• Silver Price Is Down

Some expected the defense effort to cause a shortage of silver which would strengthen the price. Instead, the silver market suffers from a dearth of buyers and the price gradually has been sagging, but you never would know it by the price of knives, forks and spoons!

• Where Is The Logic?

While the government is quibbling over spending a few dollars to get our domestic mining industry in gear, the NPA claps further restrictions on the use of copper and Western Germany arranges to pay Chile 57 cents per pound for copper. At the same time, lead and zinc get shorter and shorter and Charles Wilson orders the OPS to take such action that imports are driven off the American market.

• Tungsten Duty Is Suspended

Now that the tungsten duty has been suspended it will be interesting to see just how much imports will increase. Duty suspensions in the past, on other metals, have not been effective.

• DPA Loses Important Authority

The Defense Production Administration announced on October 5 that its authority to approve loans for industrial expansion important to the defense effort had been transferred to the RFC. All loan applications for domestic facilities are in the future to be filed with RFC field offices throughout the country. This transfer very nearly drives the final nails in the coffin of Administrator Larson of DMPA for it is hopeless to expect RFC to finance mining projects. The change was made despite the fact the President had said he was giving Larson complete responsibility for the emergency minerals program!

• Loan Functions Would Strengthen DMPA

It is rumored around Washington that the Defense Materials Procurement Agency will have transferred to it the defense loan functions in its particular field now held by the Defense Production Administration. If true, this will help materially to strengthen the position of DMPA.

WORLD MINING

The International Department of MINING WORLD

INTERNATIONAL PANORAMA

MANILA—A steel plant will be built adjoining the Maria Christina hydroelectric power plant in Mindanao. The plant will cost \$2,500,000 and is scheduled to begin operations late in 1952.

HOUSTON—The steamer "Lucille Bloomfield" has discharged 9,860 tons of iron ore from Victorla, Brazil. The ore will be used in the local steel plant of the Sheffield Steel Company.

COPPER CLIFF, ONTARIO—A new plant with an annual capacity of 90,000 tons of liquid SO₂ a year is under construction. It will use SO₂ gas produced by roasting concentrates at International Nickel Company's smelter.

WASHINGTON—The International Materials Conference has announced quotas for fourth quarter distribution of cobalt, tungsten, molybdenum and nickel to 32 countries.

FREDERICKTOWN, MISSOURI—The National Lead Company will build a new cobalt-nickel-copper refinery here at a cost of \$5,000,000. The 50-ton per day plant is scheduled for initial operation early in 1953. The new plant will use, for the first time, a newly developed process for cobalt recovery. All metals will be sold to the government under terms of an agreement with DMPA.

HENDERSON, NEVADA—The first titanium metal has been produced here by the Titanium Metals Corporation of America. The corporation expects to produce 10 tons of metal per day by late 1952. That rate would be eight times as great as total world production today.

WELKOM, ORANGE FREE STATE—The Nos. 1 and 2 shafts of the Welkom Gold Mining Company, Ltd. have been connected by underground drifts.

WASHINGTON—In order to conserve scarce building materials the Defense Production Administration has established a priority system for accelerated amortization for defense projects. The most essential projects include copper, lead, and zinc ores; pig iron; sulphur; and aluminum.

SAN FRANCISCO—The Glidden Company and the DMPA are equally sharing in the cost of exploratory diamond drilling and geological mapping of Glidden's zinc properties in Shasta County, California.

JOHANNESBURG—A new iron ore mine will be developed on the Shishen concession near Kuruman. Production of 1,500 tons per day is planned from an open pit.

CARACAS—The Orinoco Mining Company has awarded a \$2,000,000 contract for establishment of Diesel-electric generating equipment at Cerro Bolivar.

DUBLIN—The ECA has granted a development loan of \$93,600 to Silvermines Lead and Zinc Company.

RENO—A new mineral named "robinsonite" has been found in the Red Bird quicksilver mine in Pershing County. It is a lead-antimony sulphide and was named in honor of Dr. S. C. Robinson of Queens University.

WASHINGTON—Sulphur export quotas for the fourth quarter of 1951 have been set at 240,000 long tons compared to 250,000 in the third quarter.

THABAZIMBI, NORTHERN TRANSVAAL—A recent blast at the ISCOR iron mine broke 250,000 tons of ore. A total of 30,850 pounds of powder were used in the blast.

ESCANABA, MICHIGAN—The "Tom Girdler," newest Great Lakes ore carrier has been placed in service. The first cargo of ore was from the Republic Steel Corporation's Tobin mine.

WASHINGTON—The Defense Production Administration has issued a new list of those minerals with a "most critical shortage." Included are aluminum, copper, cobalt, columbian, lead, molybdenum, nickel, tin, tungsten and zinc.

PITTSBURGH—The Jones and Laughlin Steel Corporation has started the first of eleven new open hearth furnaces at its Pittsburgh works. The new furnaces will add 2,000,000 annual ingot ton capacity to J&L's steel making plants.

SINGAPORE—A United States Government tin study mission is making a visit to tin mines in the Communist infested Malayan jungles. Tin producers hope that the mission will observe the difficulties in maintaining tin production.

BUTTE—Anaconda Copper Mining Company is entering the aluminum production business. It has taken over the commitments and power contract of the Harvey Machine Company's proposed plant at Kalispell, Montana. Initial capacity of the plant to be built by Anaconda will be 54,000 annual tons of aluminum metal.

PITTSBURGH—The United States' steel industry has established another record—2,089,000 tons of steel produced in one week—the largest weekly production in history.

SANTIAGO—The new Paipote copper smelter has been placed in operation. It will treat ore from 1,000 copper mines and has an annual capacity of 18,000 tons of blister copper.

RANGOON—The Burma Corporation, Ltd. and the Burmese government have formed a new corporation, Burma Corporation (1951) Ltd. to operate the Bawdin mines.

WASHINGTON—The Munitions Board has ordered diversion of aluminum from the National stockpile to industry during the last four months of 1951.

OTTAWA—The Canadian Minister of Finance has announced that each Canadian gold mine will have the opportunity during the rest of 1951 to either sell part of its gold production for non-monetary purposes on the world market or continue to receive government aid.

SANTIAGO—Two uranium deposits have recently been discovered in central Chile. One deposit is near Tambillo, Coquimbo province and the other is in Carrizal Alto Atacama province. The Chilean government has reserved all exploration and mining rights to the deposits.

ROME—The Italian government has placed end-use restrictions on nickel, copper, zinc and their alloys. It is anticipated that the same will be done shortly for sulphur, aluminum and a variety of steel products.

Northwest Association's 57th Annual Convention

The 57th Annual Convention of the Northwest Mining Association will be held in Spokane, Washington, November 30 and December 1. Among the speakers on the program are the following:

Wallace G. Woolf, superintendent of Sullivan Mining Company's electrolytic plant near Kellogg, Idaho, who will discuss zinc and its economic ramifications; F. L. Hallam, head ore buyer for Consolidated Mining and Smelting Company of Canada at Trail, British Columbia, who will speak on the economic situation prevailing in lead mining; E. R. Marble, general manager of American Smelting and Refining Company's Tacoma smelter, who will discuss copper; Dr. J. R. Van Pelt, president of the Montana School of Mines at Butte, who will discuss new developments in mining; and Dean John R. Speelman of the Washington State School of Mines whose subject will be "The Mineral Industry, the College, and the public."

Guatemala Surveys Its Mineral Resources

The Government of Guatemala and the International Bank for Reconstruction and Development have completed a survey of Guatemala's mineral resources and of the status of current developments.

The major known resources include lead, silver, copper, zinc, chromium, and bismuth. The leading mining area is near Cobán where zinc and lead ores of high grade are found. Existence here of chrome ore also is reported. At Cachupec in this region, an American company is reported to have invested recently 1,500,000 quetzales in a new lead and zinc mine. The operation is producing about 2,000 tons of concentrates a month, or about one-third of its potential.

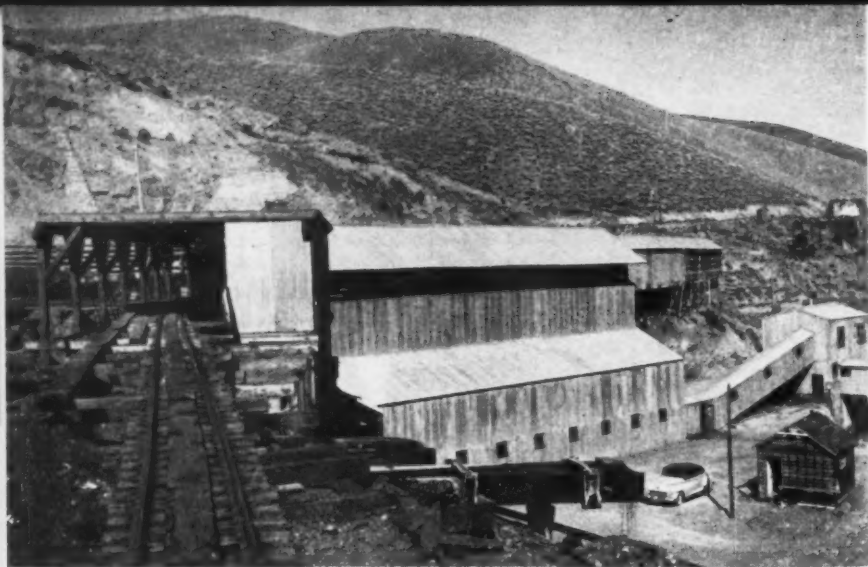
In the northwest, near San Miguel Acatan, lead output is soon to be expanded and modernized. An American company is investing more than 1,000,000 quetzales in the building of an access road, flotation plant, and smelters. Operations are expected to start this year.

A Guatemalan enterprise has developed a third region near Metatequecintla (Jalapa) for silver, lead, copper, and zinc.

The survey disclosed that Guatemala's knowledge of its minerals resources is incomplete, partly because of an acute shortage of domestic personnel trained in geology, mineralogy, and mining technology. Numerous deposits of valuable non-metallic minerals probably exist.

Non-ferrous metals are expected to find a ready market in the United States. Markets for other minerals are said to be difficult to find. Limestone products are in great demand at home.

Transportation difficulties offer the greatest single handicap to mining development. Production costs are mainly a corollary of transportation problems. Apart from transporting ores, the cost of fuel, explosives, and making supplies are reported to be high.



The tracks in the left foreground lead to the grizzly of the coarse ore bin and the crusher house of the new Triumph mill. The conveyor in the lower right leads to the lower mill buildings shown on the facing page. The mill has reached a production rate that is over 50 percent in excess of its rated capacity.



Mill Superintendent M. A. Jorgensen, formerly superintendent of the Buchans concentrator in Newfoundland, has watched the Triumph mill grow to be one of the most prominent plants in the Hailey-Ketchum area.

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A modern milling operation has reached production in the heart of one of the nation's most popular year-around vacation lands—central Idaho. Only a few miles of paved highway separate the Triumph Mining Company's operation at Triumph, Idaho, from world-famed Sun Valley. All of the advantages offered by a country that is considered the vacationist's delight, however, will not, in themselves, make a mining enterprise successful and the Triumph has had more than its share of difficulties. General Manager A. H. Shoemaker remarked recently, "Here (at Triumph) you see a mine that has been built on faith."

A mine in spite of odds

Prospectors drove the first location adit on the present Triumph property into a hillside barren of any surface expression of mineralization. In the face of such overwhelming odds, a successful operation could hardly be predicted. Nevertheless, gold-silver-lead-zinc ore was encountered in the adit and the first active mining was begun. Two separate ore occurrences were later identified—one, a highly car-

bonaceous mineralized schist; the other, more siliceous with little or no carbon present. The ore's main constituent minerals, complexly interlocked, are galena, sphalerite, pyrite, arsenopyrite, quartz, and, in the one case, carbon. Silver is carried in the galena and minor gold values occur with the arsenopyrite. The gangue is composed of the bar-

ren pyrite, quartz, and carbon. Prior to 1915 a gravity mill was built on the property to handle this complex ore.

The development of large reserves has always presented a problem; core drilling is not satisfactorily effective and the capricious nature of the ore occurrences makes nearly impossible the prediction of structural patterns.

The rubble and concrete shown here is all that remains of the original Triumph concentrator, a gravity mill that burned in 1947.



Until comparatively recent times, the Triumph could never number among its assets the vast tonnages of proven ore reserves that are necessary in insuring continuous operation in the event of large capital losses.

Heavy loss by fire

In January 1947, the Triumph gravity concentrator was completely destroyed by fire. The loss, representing over \$300,000, could possibly have meant, even in normal times, the death knell of the Triumph operation. In 1947 the loss was especially severe. The mining industry was suffering a period of insecurity caused by the disrupting influences of peace-time readjustments and their attendant industrial problems—short labor markets, strikes, and political indecision. These, together with an increasing public demand for expanded production of civilian goods on which to dissipate the backlog of dollars that had been accumulating, caused the mining industry to find itself between a blue sky and a stormy sea. The blue sky was represented by base metal prices that had almost doubled in less than a year and a nearly insatiable market for all that could be produced. The stormy sea was due to war-ravaged equipment and ore reserves, a seemingly imminent world depression, high taxes, rapidly alternating control and decontrol of price ceilings, and a critical labor situation; the last three controlled in large part by a confusing political atmosphere that appeared to be undergoing a cycle of major change.

In short, new industrial investments were, at best, subject to risks so considerable as to preclude major



The lower mill buildings of the Triumph property are shown in the foreground. The foundation of the old mill that burned can be seen in the left background and the town of Triumph is in the center background. The concentrator, located near famous Sun Valley in Idaho, is serviced by six miles of bituminous-surfaced access road. Concentrates of lead and zinc are trucked to transfer docks at Gimlet, Idaho, and thence to market smelters via the Union Pacific railroad.

expenditures. For this reason, the Triumph Mining Company delayed the construction of a new mill, shipping its ore to Bauer, Utah, for concentration. A development program was immediately begun to block out ore reserves sufficient to amortize the investment required for the construction of a new mill.

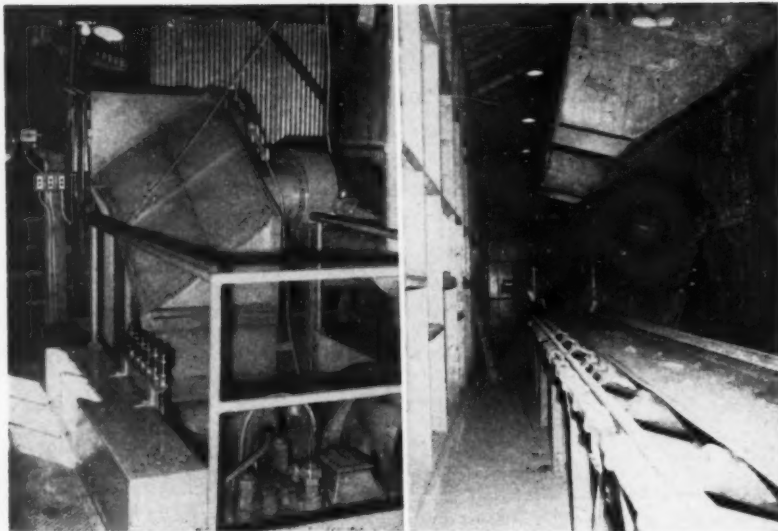
New ore reserves—new mill

Early in 1950, a period more favorable to new investments, ore reserves were considered to be large enough to warrant plant expansion and the Western-Knapp Engineering Company, a division of the Western Machinery Company of San Francisco, was called on to design and construct a modern mill that would handle the Triumph ore.

The mill design requirements were set to produce an efficient concentrator of 200 tons of ore daily, a completely fire-proof structure, and a plant in which good housekeeping could be maintained with a minimum of effort and expense. The first of these requirements, of course, was the most important. The major problem in concentrating the Triumph ore was the presence of considerable quantities of adhesive carbonaceous material that made screening and secondary crushing impossible due to the lumps formed from the fines. Surprisingly enough, coupled with the troublesome carbonaceous nature of the ore was its remarkably abrasive character that, in the opinion of experienced mill men, could not be attributed solely to the identified

LEFT: The mine portal in the center of this scene is the surface terminal of the main haulage adit at the Triumph mine. The mine office buildings are to the left. The track leading to the right takes the ore to the crude ore bin. The track to the left passes the framing mill, the timber yard and the waste dumps. RIGHT: Looking up the valley of the East Fork of the Big Wood river toward the Triumph properties. The access road can be seen in the left foreground.





LEFT: The grizzly in the upper center of this picture separates the minus-two-inch fraction from the crude ore and feeds the coarser material to the primary jaw crusher, set at two inches. The blower system on the right removes the dust made by the crusher and grizzly. This is but one of the many features in the design of the plant that makes the Triumph mill one of the most modern and cleanest of its kind. RIGHT: The automatic unloader in the center of the picture is an apron feeder that rolls along the tracks bordering the conveyor and feeds crude ore from the seven primary bins to the conveyor system.

minerals present either as ore or as gangue material. Wherever crude ore was handled, all moving parts were subject to wear so rapid that constant replacement and repair were required.

Fines removed in crusher circuit

The problem of removing the fines was finally solved by placing a classifier in the mill circuit between the primary and secondary crushers. Results of mill operation to date show that nearly 25 percent of the crude ore is removed by this classifier in the form of slimes containing the troublesome carbon fraction together with much of the quartz gangue.

The efficiency of the original scheme of gravity concentration left much to be desired but the carbon made flotation difficult. Heavy media separation was considered and experiments at Wemco's laboratories in San Francisco proved HMS could be effectively used. The obstacles to flotation were overcome, however, by depressing the carbon with American Cyanamid's 600 series of reagents. Since HMS was considered to be more profitable than flotation only on tonnages larger than anticipated production at Triumph would yield, a flotation mill was designed and construction begun.

Modern, fireproof buildings

The mill and appurtenant buildings are built entirely of steel and reinforced concrete to make the

structure as nearly fireproof as is possible; offices in the main mill building for the mill superintendent and for the laboratories are partitioned with transite sheeting as a further precaution against fire. The floors of the upper decks of the mill building are formed from steel grating so that dust and dirt that would normally collect on these floors is by-passed to lower levels. In this way cleaning can be concentrated on a single floor. To further decrease the dead work necessary for the maintenance of a clean plant,

the major dust producers—crushers, grizzlies, and the like—are closely covered and, in some cases, provided with blowers that remove any dust produced. Construction of the plant was under the direction of Steve Mitchell, Superintendent for Western-Knapp Engineering Company.

Mill Superintendent M. A. Jorgensen, formerly superintendent of the Buchans concentrator in Newfoundland, became actively interested in the Triumph during the initial stages of construction. He now supervises operation of the plant that he watched grow into one of the newest and most modern of its kind in the western states.

Short haul from mine to mill

The ore, mixed carbonaceous and siliceous types, comes directly from the main haulage adit of the mine to the head of the mill where it is side-dumped through a 10-inch grizzly into seven 75-ton crude ore bins. An auxiliary bin has been provided for use either as mill feed storage or for waste disposal as need dictates.

Primary crushing

A 30-inch Stevens-Adamson apron feeder transfers the ore from the bins to a 30-inch belt conveyor. A grizzly at the end of the conveyor separates the ore into two fractions—plus and minus two inches. The coarse fraction is crushed to minus two inches by a 15- by 24-inch Blake-type, Traylor jaw crusher which the finer fraction by-passes.

An 18-inch belt conveyor then

The 24-inch vari-speed feeder conveyor in the background feeds ore to the 48-inch Wemco Special Helix classifier to remove the troublesome fines of carbon and quartz. Such use of a classifier in the crushing section is unique in mill designs; it was originally thought that HMS treatment would be required for this purpose.



transfers the ore to a 300-ton steel bin at the head of the main mill building. From this bin the ore is taken by a 24-inch vari-speed feeder conveyor to the 48-inch Wemco Special Helix classifier that removes as slime the troublesome carbon, bypassing it around the secondary crushing and grinding sections.

Secondary crushing & grinding

The sands from the classifier are transferred by an 18-inch conveyor to a three by eight foot Allis-Chalmers Ripl-Flo screen where the ore is again separated into two fractions—plus and minus $\frac{1}{2}$ inch. The coarser material is crushed to minus $\frac{1}{2}$ inch by a Symons cone crusher. The fine fraction and the crushed coarse fraction are then joined and fed to a seven by six foot Allis-Chalmers ball mill operating in closed circuit with a 36-inch

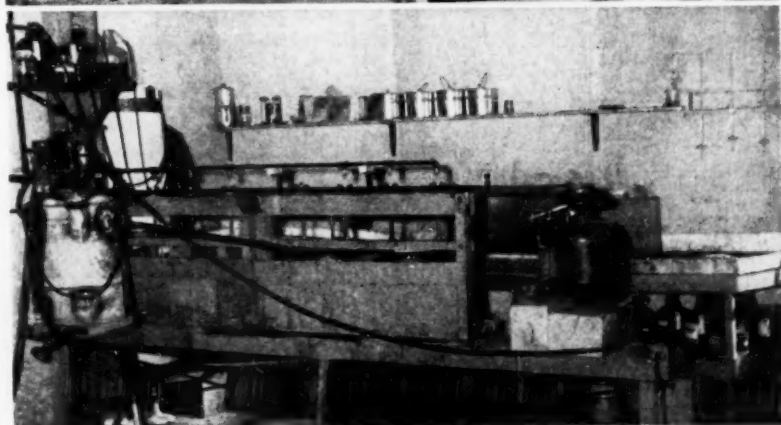
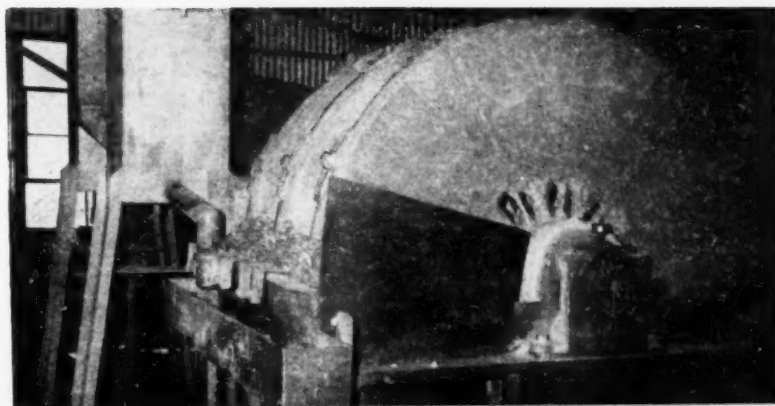
TOP: This 6-foot, three-leaf Eimco filter handles the zinc concentrates. **CENTER TOP:** The tailing pond shown here is fed by the trestled tailing flume that follows its periphery. **CENTER BOTTOM:** One of the three loading docks on the Union Pacific railroad at Gimlet, Idaho, that handle the lead and zinc concentrates from the Triumph mill. **BOTTOM:** This bank of experimental flotation cells in the laboratory are being used to test recovery methods on the auriferous arsenopyrite carried in the ore. The cells and conditioner (seen on the left of the bank of cells) are connected into the mill circuit so that continuous operation is possible.

Wemco Special Helix classifier that receives the overflow from the primary classifier in the crushing circuit.

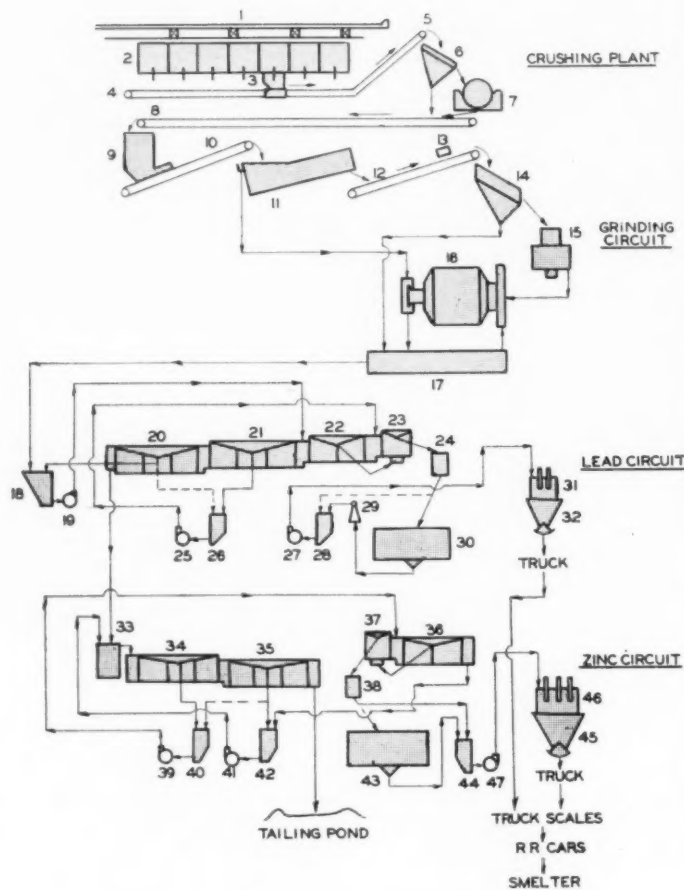
Flotation

Overflow from the second classifier is pumped to the lead flotation circuit made up of 44-inch Fagregren-type Wemco cells. Six cells are used in the rougher circuit, two in the primary cleaner, and one in the secondary cleaner. The lead concentrate, after being dewatered by a 20-foot Wemco thickener and a six-foot, two-leaf Eimco filter, is temporarily stored in a 75-ton steel concentrate bin.

Tailing from the lead circuit flows by gravity to a five by six foot Wemco conditioner in preparation for zinc flotation. After flotation in a circuit similar to that for lead and dewatering by a 20-foot Wemco thickener and a six-foot, three-leaf Eimco filter, the zinc concentrate is temporarily stored in a second 75-ton steel bin to await shipment. Both the lead and zinc concentrates are trucked six miles over a paved highway from the mill to the transfer docks on the Union Pacific railroad near Gimlet, Idaho. Tailing from the mill is carried by a trestled flume to



TRIUMPH MINING COMPANY MILL FLOW SHEET



EQUIPMENT LIST

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	UNLOADING PLATFORM WITH 10' GRIZZLY	25	1-4" WEMCO SAND PUMP
2	7-100 TON BINS WITH GATES	26	1-PUMP FEED BOX
3	1-30" TRAVELLING FEEDER & HOPPER	27	1-4" WEMCO SAND PUMP
4	1-30" BELT CONVEYOR	28	1-PUMP FEED BOX
5	1-MAGNETIC PULLEY	29	1-2" WEMCO DIAPHRAGM PUMP
6	1-3x5x2 1/2" OPENING BAR GRIZZLY	30	1-20x8' WEMCO THICKENER
7	1-15x24" TRAYLOR JAW CRUSHER	31	1-2 LEAF EIMCO FILTER
8	1-18" BELT CONVEYOR	32	1-75 TON CONCENTRATE STORAGE BIN
9	1-300 TON ORE BIN	33	1-5x6' WEMCO CONDITIONER TANK
10	1-24" POCHE FEEDER CONVEYOR	34	3-44" WEMCO-FAGERGREN FLOTATION CELLS
11	1-48" WEMCO SH CLASSIFIER	35	3-44" WEMCO-FAGERGREN FLOTATION CELLS
12	1-18" CONVEYOR	36	2-44" WEMCO-FAGERGREN FLOTATION CELLS
13	1- SUSPENDED ELECTROMAGNET	37	1-44" WEMCO-FAGERGREN FLOTATION CELLS
14	1-3x8x 1/2" OPENING ALLIS CHALMERS SCREEN	38	1- JUNCTION BOX
15	1-2" SYMONS CONE CRUSHER	39	1-4" WEMCO SAND PUMP
16	1-7x6" ALLIS CHALMERS BALL MILL	40	1- PUMP FEED BOX
17	1-36" WEMCO S-H CLASSIFIER	41	1-4" WEMCO SAND PUMP
18	1-CONCRETE SUMP	42	1- PUMP FEED BOX
19	1-2" WEMCO SAND PUMP	43	1-20x8' WEMCO THICKENER
20	3-44" WEMCO-FAGERGREN FLOTATION CELLS	44	1- PUMP FEED BOX
21	3-44" WEMCO-FAGERGREN FLOTATION CELLS	45	1-75 TON CONCENTRATE STORAGE BIN
22	2-44" WEMCO-FAGERGREN FLOTATION CELLS	46	1-3 LEAF EIMCO FILTER
23	1-44" WEMCO-FAGERGREN FLOTATION CELL	47	1-4" WEMCO SAND PUMP
24	1- JUNCTION BOX		

a pond in the valley below the mine and mill.

Research problem

Concentration of the auriferous arsenopyrite carried with the ore is not provided for at present. In an attempt to devise a system that will effectively produce a marketable concentrate from this material, a bank of small experimental flotation cells were built in the laboratory in the main mill building. They are connected into the mill circuit in such a way that continuous rather than batch operation is possible, producing results that are more truly representative of a full-scale operation. Though successful concentration of the arsenopyrite is by no means certain, Superintendent Jorgensen will consider the experiment well worth the trouble if it proves conclusively that profitable concentration is presently either possible or impossible.

Exceeds rated production

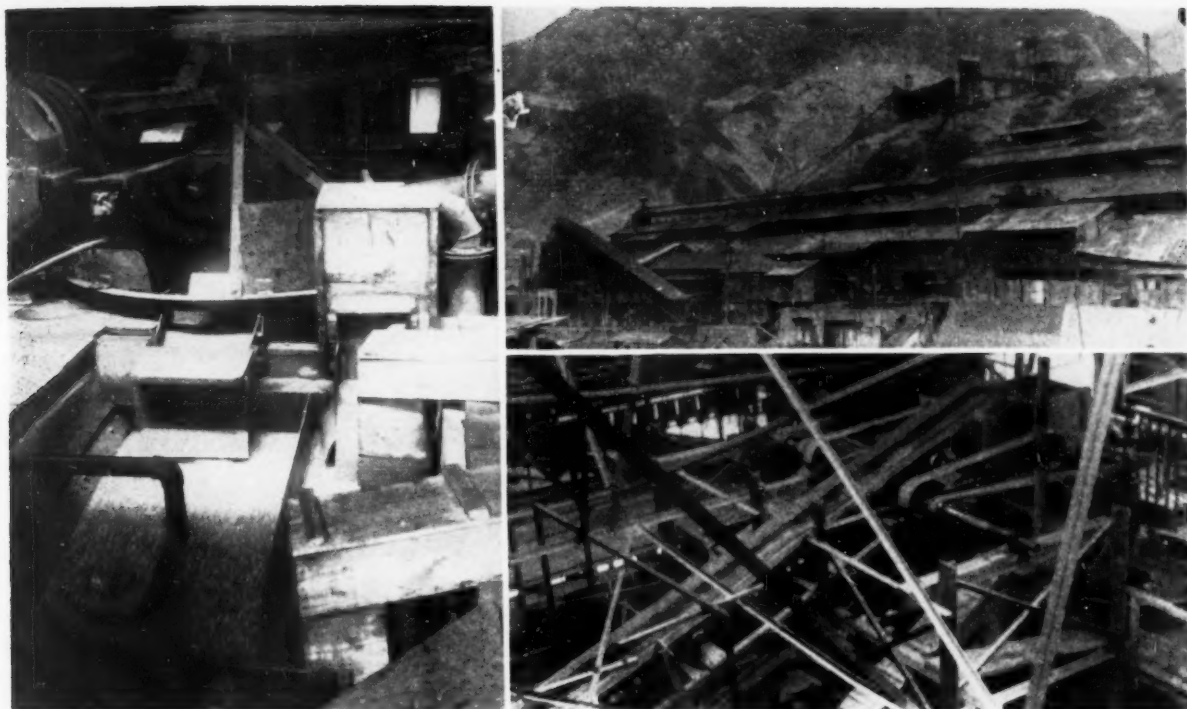
Since the first shake-down of the new mill in February 1951, ore has been pushed through the plant in ever increasing tonnages to test the maximum possible production rate. So far, the record daily mill heads used has been 360 tons—a figure considerably in excess of the design requirements of 200 tons. The mill is now processing on the average of 300 tons of crude ore a day. Since mining was also planned for a daily production of 200 tons, the mill has been using dump material mixed with mine ore. Mining is now being stepped up to keep pace of mill requirements.

Fire protection for town and mill

The water to supply the mill and the adjacent company town of Triumph comes from a well sunk near the edge of the East Fork of the Big Wood river, less than a mile from the mill site. The water is lifted to a 24,000-gallon tank above the mill for storage. De-sanded mine water joins the mill supply for added volume. A completely modern fire protection system was built during mill construction to protect both the surface plant and the town.

Triumph now secure

For one of the few times in the history of its operation, the Triumph Mining Company is now in a secure position—metal prices are up, ore reserves have been blocked out, the new mill has proved to be a modern, efficient plant, and the operation is directed by a competent and experienced management.



Left: This six-foot HMS cone was installed in 1948 at the Ashio mill of the Furukawa Mining Company, Tochigi Prefecture, Japan. Note the feed to the cone dropping from the belt conveyor on the left. The float product is discharged over the washing screen in the foreground. Top right: Shown above is a section of the copper smelter at the main mine (Honzan) of the Ashio copper mine. Ore is mined from a large number of veins found in the mountain in the background. Bottom right: One of the six-foot cones at Ashio can be seen at the lower right. Lowgrade copper ore is fed to the cone by the inclined belt conveyor. Thirty to forty tons of minus-5-mm., plus 15-mm. ore is treated per hour by this cone.

ASHIO RECOVERS COPPER BY HMS

The first commercial Heavy-Media-Separation plant in Japan treats lowgrade copper ore from the Ashio Mine of the Furukawa Mining Co.

The Ashio copper mine operated since 1877 by the Furukawa Mining Company is one of the four largest Japanese copper mines. It is located in the mountainous region of Tochigi Prefecture, about 125 miles north of Tokyo. The largest mine (Honzan) was in operation before the year 1650. The Adit level (T_udo) was later developed south of the Honzan mine.

HMS Plant Started in 1948

In the past the grade of ore treated was much higher and direct smelting ore and waste were sorted out by hand. During the last war the grade of ore declined markedly and underground development was drastically curtailed. Following the war, the grade of ore continued to decline and milling costs advanced largely due to increasing ball milling costs.

The Furukawa Company has been

continually interested in introducing American methods and equipment at its mines in Japan. It was the first Japanese company to build and operate a commercial-size Heavy-Media-Separation plant in Japan. The plant was placed in operation in March, 1948, after extensive labora-

tory test work on Ashio ore had proven successful and indicated lower milling costs.

Two Types of Orebodies

The Ashio copper ore has been mined from over 100 fissure veins containing copper sulfide minerals

An interior view of the electrolytic copper refinery of the Furukawa Electric Co., Ltd., at Nikko. All copper from the Ashio mine, mill and smelter is refined at this plant.



in a quartz gangue. These veins, in rhyolite, have been mined over a strike length of 6,000 feet in some

instances. In recent years massive chalcovrite orebodies have been found in quartzite. These are called

the "Kajika deposits" and contain over 5.0 percent copper. Mine production now is about 1,000 tons of 1.0 percent and 30 to 40 tons of 5.0 percent copper ore per day.

Cone Operation

The first HMS cone placed in operation had a six-foot diameter at the top. Thirty to forty tons of ore are fed into the cone each hour by an inclined conveyor belt. Feed for the cones is sized by grizzlies, trommel and vibrating screens. Slimes are washed from the ore during screening. The feed to the cones is sized to minus-5-mm., plus-15-mm. before being fed to the cone. Specific gravity at the top of the cone is held at 2.60 and 2.70 at the bottom.

Slag for Media

When the plant was first placed in operation, ferrosilicon made by the Kanto Electric Industry Company was used. It had a specific gravity of 6.48, and all minus-100-mesh with 55 percent of it being minus-200-mesh. Media consumption was 1,800 grains per ton of ore treated. At present, due to the higher cost of ferrosilicon media, a crushed slag containing 13 to 18 percent ferrosilicon is used at Ashio for media.

Operating Results

Operation of the first cone has been satisfactory with the float product assaying 0.12 percent copper. Pilot plant operation of the two new cones indicates that when vein ore is treated the float product will constitute about 80 percent of the feed and assays 0.10 percent copper. When "Kajika" ore is treated the float product is from 30 to 50 percent of the feed and assays 0.15 to 0.16 percent copper.

Fine Grinding-Flotation

The sink product is conveyed to a ball mill-classifier circuit where it is ground to minus-200-mesh for flotation. From 50 to 60 tons of 18 percent copper flotation concentrate is recovered per 1,000 tons of crude ore milled.

Copper concentrates are smelted at the company's smelter at the Honzan mine. This smelter also treats custom ore and copper scrap.

Lower Costs Achieved

The HMS plant has been successful in reducing milling costs with less sliming of ores. It is very significant that the process has proved to be superior to hand sorting which was considered as standard practice and used for centuries in Japan where labor is cheap and abundant.



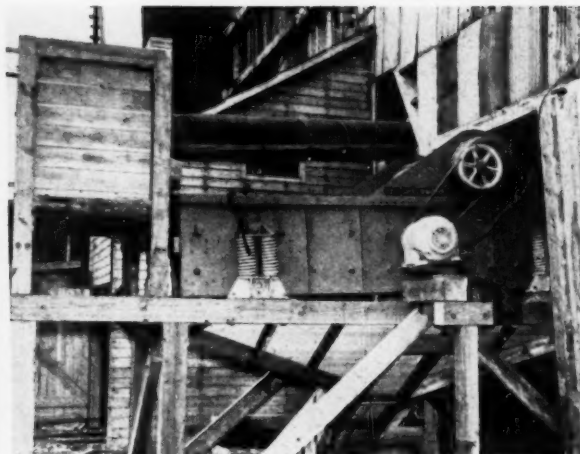
The Ashio HMS-flotation mill is located at the portal of the adit level (Tsudō). Note the concrete towers for the aerial tram in the background.



A view of the portal of the adit level of the Ashio copper mine.



This is a section of the Ashio mill with the Watanase river in the background. Dormitories for the employees are in the right background.



LEFT: These Gardner-Denver Company, 100-hp., centrifugal pumps are on the 330-foot level. They discharge into the 10-inch pump column into which the ore is injected for "Hydraulic Hoisting" to the surface. RIGHT: The top of the pump column is in the mill behind the Dewaterizer. Ore and water flow through the 10-inch pipe from the mill to the Hewitt-Robins Eliptex Dewaterizer. The water flows to a settling pond and the ore enters the mill circuit.

"HYDRAULIC HOISTING" NOW USED AT CALUMET & HECLA'S ZINC MINE

The Gardner system for "Hydraulic Hoisting" of ore from underground mines has been successfully used on a commercial scale at Calumet and Hecla Consolidated Copper Company's Wisconsin Branch at Shullsbury, Wisconsin.*

In making this progress report, Percy S. Gardner, Jr., inventor of the system, emphasized the fact that the mine's existing underground pumping plant, electrical motors, wiring system, and 10-inch, vertical, discharge water column are used.

Underground Equipment

An ore injection system** consisting of two chambers, a displacement pump, a pressure equalizing valve, and solenoid actuated flap valves has been installed on the mine's 330-foot level. The primary jaw crusher from the mill has been moved underground and also a conveyor belt so that the underground ore flow is now through the jaw crusher onto the belt for elevation and transportation to the ore pocket.

* See *Mining World*, June 1951, for a detailed description of zinc-lead mining and milling operations at the Wisconsin Branch of Calumet and Hecla.

** See "Hydraulic Hoisting" in the October 1950 issue of *Mining World*.

From the pocket, the ore can be loaded into the hoisting skips or dropped to the hydraulic hoist.

Operational Data

Hoisting demonstrations for as long as 45 minutes have been successfully made by the normal mine crew. No trouble has been experienced in starting the injection system after a shut down. The mine pumps, of course, operate continuously. Indicated ore capacity of the system is 120 tons per hour in a 2,000 gpm. pump discharge. The rate of ore ascendancy in the water column is about 500 feet per minute. This is several times the "teeter velocity" which must be exceeded in order to lift the ore in the water stream. It has been found that an ascendancy velocity of less than eight feet per second will not create enough "action" past the injection chamber so that the ore will not enter the pump column.

Large Ore Pieces Hoisted

The jaw crusher discharge is set at four inches, but, due to the slabby nature of the ore, many pieces with at least two dimensions

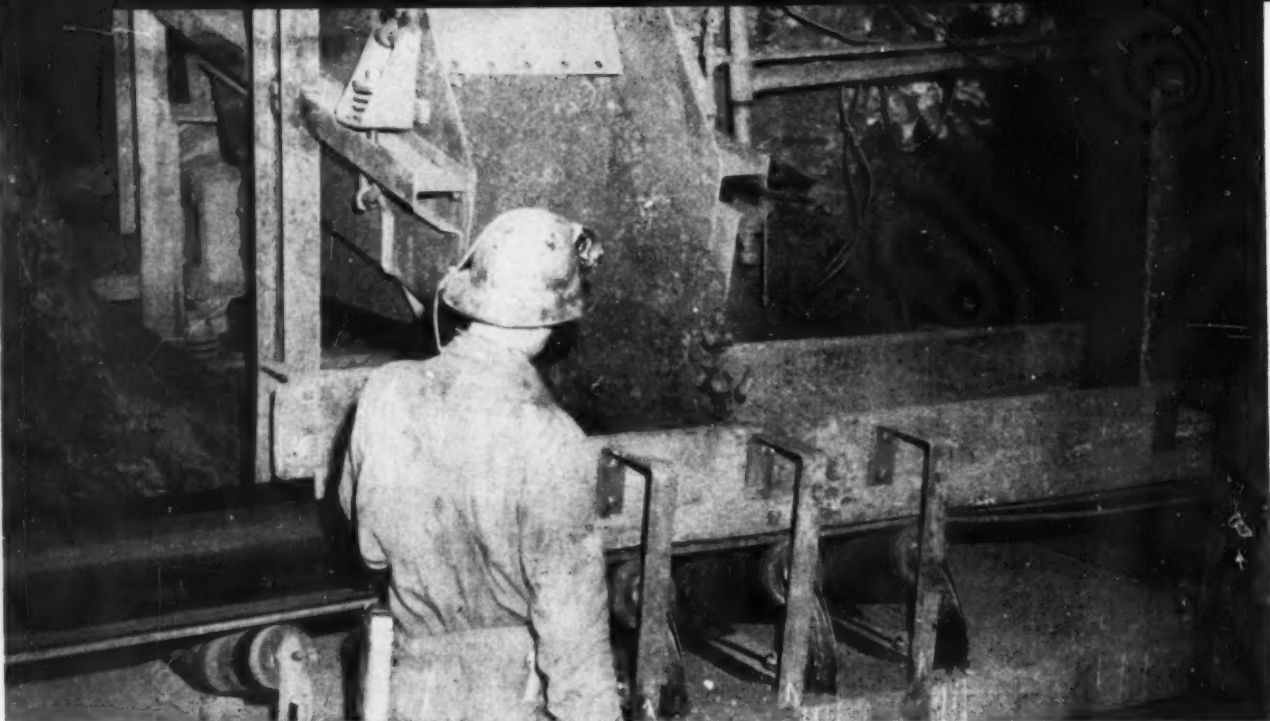
larger than four inches have been hoisted. One measured piece was 14 by 9 by 4 inches.

Dewaterizer in Mill

The upper end of the pump column is located in the mill building on the surface. Water and ore overflow from the open-ended column and are piped to a temporarily placed Hewitt-Robins Eliptex Dewaterizer just outside the building. The dewaterizer has an elliptical motion, super-imposed on a circular motion. From the dewaterizer the ore enters the mill circuit and the water flows to a settling pond from which fine particles of ore will be reclaimed.

The Future

The Shullsbury mine is ideally suited for the first commercial operation. Further tests are underway and it appears economically possible to use the system for elevating large particles instead of using bucket elevators or centrifugal pumps, in some mill circuits. A possible application is for the "hoisting" of ½-inch diameter jig concentrate in a four-inch pipe.



An electro-magnetic vibrating feeder loads iron ore onto a 36-inch-wide belt conveyor on the 1200-foot level in Inland Steel Company's Sherwood mine, Iron River, Michigan. Note the rubber shock-absorbing rollers under the belt at the loading point.

THE ADVANTAGES OF MOVING IRON ORE BY UNDERGROUND CONVEYORS

On the 1200-foot level of Inland Steel Company's Sherwood mine five belts transported 414,618 tons of ore in 1950

There is a staggering difference between tons of ore mined per man-hour in today's modern mine and tons mined in what was considered an up-to-date mine in the 1880's.

Today, Inland Steel Company's Sherwood iron ore mine, Iron River, Michigan, with the aid of underground belt conveyors, electro-magnetic vibrating feeders and a versatile dump unit for winter stockpiling on the surface, produces approximately 500,000 tons annually with a work force of roughly 90 men. Compare these figures with less than 250,000 tons of ore produced with over 400 miners—the record of the Champion mine, Champion, Michigan, in 1882.

The Sherwood mine is a comparatively new one, having been opened in 1941. The total property consists of 80 acres with an estimated ore reserve of several million tons. The orebody at this location is highly folded, and consists of a dark red and brown hematite and limonite which lie in a large syncline with



The Sherwood mine is under the direction of Phillip D. Pearson, superintendent, Inland Steel's Menominee Range operations.

an east-west axis. When broken from the breast, ore varies in size from plus-12-inches down to dust. It is classified as a semi-hard iron ore—harder than the soft ores of the Marquette range but not as hard as the "hard ores." This characteristic of the ore presented several problems

in determining the type of belt and loading points necessary to overcome the abrasive action of the material to be moved. Ore is found at depths from 300 to 1600 feet below the surface.

Cost Saving Justifies Belts

When the mine was first opened, a system of scrapers, electric locomotives and cars was employed to move ore from the breast to the hoisting shaft. By 1946, main production at the Sherwood was centered on the 1200-foot level. After reviewing original cost, operational and maintenance expense, the decision was made by company management to install a system of belt conveyors on this level. The basis for this decision were roughly the following:

1. Approximately 5,000,000 tons of ore was expected to be moved at this point.
2. Installation cost of the conveyor system would be \$90,000 (this figure, as those that follow, are based on the 1944 dollar), and the estimated

cost of transportation of this amount of ore would be approximately \$0.05 per ton (including depreciation) by belt conveyor.

3. Cost of tramming the same amount of ore over the same period would be roughly \$0.0893 per ton.

Every iron range and each individual mine have problems that are peculiar to themselves. The Sherwood mine is no exception to this fact and the application of belt conveyors here was an experiment presenting many additional questions to the ones ordinarily posed by accepted belt installations. In addition to the hard characteristic of the ore already mentioned, the lowering of a six-ton roll of belting down the shaft presented an interesting problem. The 1023-foot-long roll of belting was suspended under the cage, supported by chains attached directly to the hoisting cables, not to the cage. The roll was lowered 1,200 feet down the shaft with only two inches clearance at either end of the long axis of the roll.

Four Belts, 36-inches Wide

In the installation at the Sherwood mine there are five principal conveyor flights. Four belts feed to the fifth belt (No. 1) which discharges in the skip pocket. The No. 1 belt, 818 feet center to center, receives feed from belts Nos. 2 and 3 which operate at right-angles to it and on opposite sides, and delivers ore to a storage pocket at the shaft. All belts are 36 inches wide and have a capacity of 250 tons per hour, operating at 200 feet per minute.

Comparison of Initial Cost of Equipment for Locomotive and Car Haulage versus Conveyor Belts at Sherwood Mine

Locomotives and Cars		Conveyor Frames and Belts	
Item	Cost	Item	Cost
Two six-ton locomotives	\$18,000	Conveyors Nos. 1 and 2	\$51,000
32 five-ton cars	38,000	Installation	6,000
Three car-dumpers	3,900	Conveyor No. 3	30,000
		Installation	3,000
Total	\$60,300		\$90,000

Comparison of Capacity, Tons of Ore Moved per Kilowatt Hour and Power Cost per 1,000 Tons of Ore Moved by Locomotive and Cars and Conveyor Belts¹

	Mine-Car Train	Conveyor Belts
Maximum tons per hour	100	250
Tons per kwh.	2.4	8.3
Power cost per 1,000 tons	\$5.46	\$1.56

¹ Electricity cost at \$0.013 per kwh.

Each is powered by an individual 20 hp. AC electric motor. The rise from the tail pulley to the head pulley of conveyor No. 1 is 2.1 feet; of conveyor No. 2 is 4.8 feet; and of conveyor No. 3 is 5.5 feet.

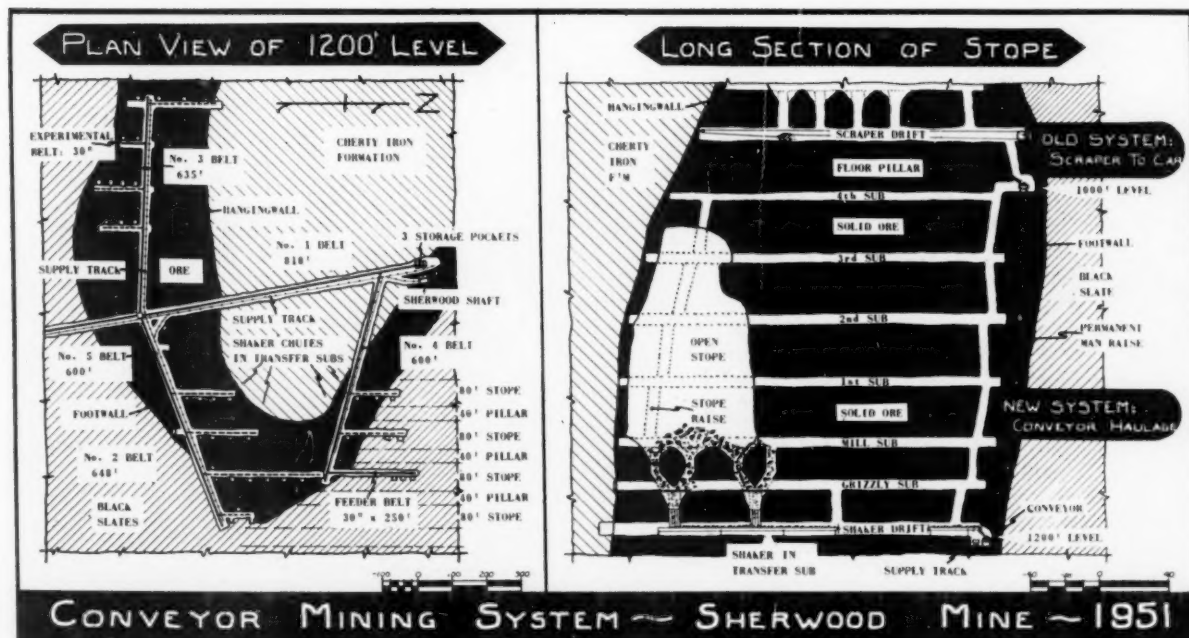
Conveyor No. 2 operates in an easterly direction from belt No. 1 and on centers of 648 feet. Belt No. 3, operating in a westerly direction from belt No. 1, measures 635 feet, center to center. No. 5 conveyor belt, a 30-inch belt on 600-foot centers, has been added as a straight line extension beyond the end of No. 1 belt. Ore from No. 5 is transferred to No. 1 at the same point where feed from Nos. 2 and 3 is transferred to the main belt. There is also a No. 4 belt operating in an easterly direction from No. 1 with which it connects at a point near the

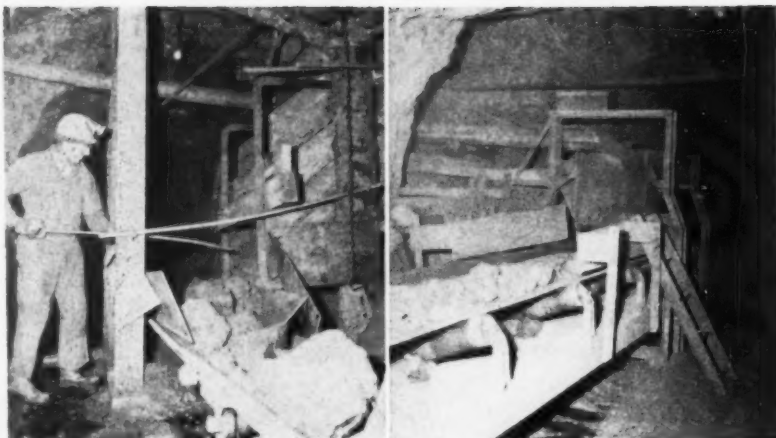
shaft. This conveyor is on 600-foot centers.

All belt conveyors are loaded by shaking conveyors, short feeder belts or electro-magnetic vibrating feeders. These last named represent the latest type of belt loading at the mine. The feeders are located under pockets which in turn are filled by scrapers operating in the transfer sublevel above. Scraper buckets dump ore over a rail grizzly with nine-inch spacing. Ore that hangs up on the rails is broken through by pneumatic hammers.

Two-Man Operation

The entire belt installation is electrically controlled and interconnected so that if any section of the system, including the No. 1 belt, is not operating, all equipment behind





LEFT: Coarse ore from a stope is pulled onto a shaking conveyor by Attilio Tessaro. The shaking conveyor is efficient for moving ore in the sublevels up to a distance of 200 feet. Ore from the conveyors feeds to the belt system. RIGHT: This is a typical transfer point where ore on the 24-inch-wide shaking conveyor drops onto a 36-inch-wide belt conveyor.

this point is automatically stopped. Normal operation of the best system requires two men. One man at the shaft end of the No. 1 belt conveyor controls butterfly gates that direct ore from the belt into the proper skip pocket. The second man is stationed at the intersection of the three belts to keep watch on their operation and to record the time that each contact is loading the main belt.

The period of time during which each separate shaking unit or vibrating feeder is operating is used as a basis for computing the tonnage of material coming from a given stope. A time-tonnage factor has been determined for each unit so that the output of each can be estimated closely. Two of these units, operating simultaneously, load the main belt to capacity.

A system of signal lights has been installed so that the man at the belt-transfer point can tell which loading unit is operating and the duration of time it is feeding. Further controls on the conveyor system include switches spaced throughout the mine from which the entire system can be stopped should trouble develop at any one point.

Faster, Cheaper, Safer

Foremen and miners who work with the belts are enthusiastic about the installation and feel that belts have come to stay in underground iron ore mines. The conveyor belt installation at the Sherwood mine has increased the amount of ore moved over a given length of time; produced it at a lower overall cost per ton; and lowered the accident rate per ton of ore moved from breast to shaft.

Ore from the final No. 1 belt conveyor section is dumped into one of three storage pockets at the either of two measuring pockets each holding one skip load of ore skips. Minus-nine-inch ore is discharged from the skips to a gyra-

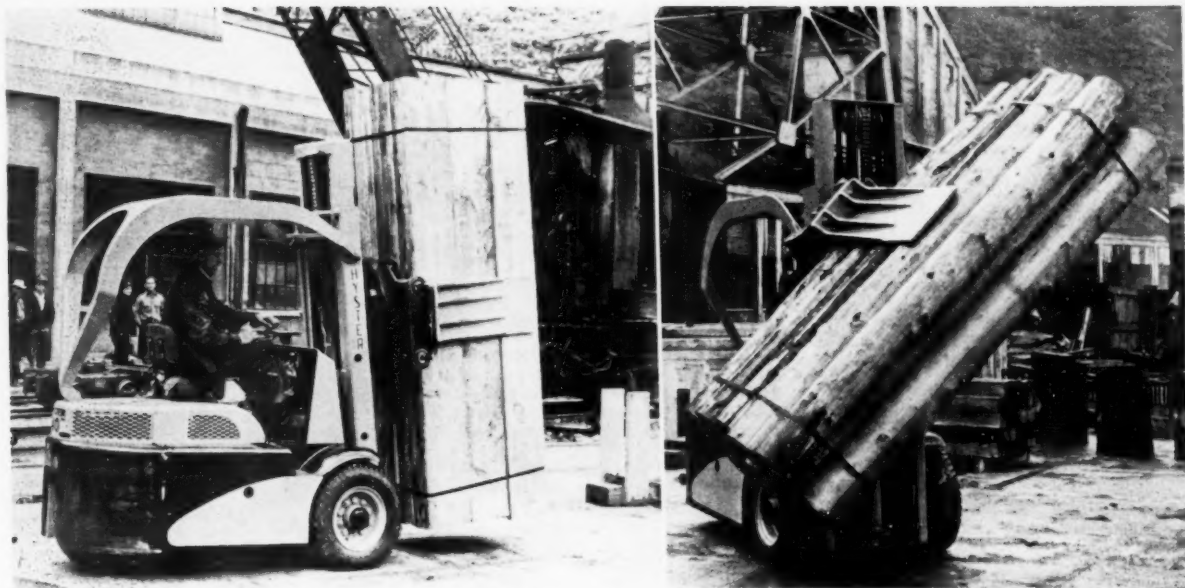
tory crusher located in the headframe for crushing to minus-three-inch size.

During summer months ore is loaded directly to railroad cars from a loading bin in the headframe. During winter months the ore is stockpiled. For this operation a Koehring Dumptor is employed which is loaded in the headframe from the bin under the crusher. This single rubber-tired dump unit stockpiles all the output of the mine. Management states that this method of winter stockpiling represents a large saving in man-hours over the constant relocation of tracks for a narrow-gauge tram system.

R. D. Satterley is general superintendent in charge of Inland's iron mines, with offices in Ishpeming, Michigan. Philip Pearson is superintendent of the Sherwood mine and Michigan. Philip Pearson is superintendent of the Sherwood mine and also of the entire Menominee Range, including the new Cayia mine at Crystal Falls. W. Johnson is mine captain at the Sherwood.

TOP: At the belt conveyors' control panel during a brief shutdown of the belts are (left to right) W. "Hi" Johnson, mine captain; M. L. Kunkaski, belt man; Jack Johnson, day shift boss, and William Farrath, maintenance foreman. BOTTOM: Howard Sleeman, Sherwood mine's master mechanic, with a roll of 36-inch conveyor belt ready to be lowered down the shaft.





LEFT: A fork lift truck with Load Grab attachment transporting strapped lagging from storage to shaft collar. RIGHT: A Hyster "40" lift truck with a 4,000 pound capacity handling bundles of round mine timber with the Roll Grab attachment.

MECHANIZED EQUIPMENT HANDLES PRE-BUNDLED MINE TIMBER

By Don Holm

**Hyster Company,
Portland, Oregon.**

The routine handling of materials in the mining industry, as in every industry, is a major problem that has never been satisfactorily solved by employing hand labor. It has only been in the last few years that any really new improvements in mechanical handling have been developed. But these improvements—principally the fork lift truck and the mobile crane—have done a spectacular job in reducing handling costs and releasing workmen for production duties.

Among the progressive mining companies that are turning to these versatile and efficient materials handling machines are the Anaconda Copper Mining Company at Butte, Montana; the Sullivan Mining Company at Burke, Idaho; and the Day Mines, Inc. at Wallace, Idaho.

Sullivan Shifts Surface Crew

The Sullivan Mining Company, a large lead and zinc producer, uses

six such machines. They are the Hyster "75," a "40" with revolving Load Grab, three "20" Lift trucks and one Karry Krane. Sullivan invested about \$25,000 in Hyster materials handling machines, and in paving and improving yard conditions so that a full-scale mechanical materials handling system could be put into effect. The company has reported that the expenditure was returned within a year, and that nine men from the handling operation were shifted to production work underground.

The "75" is used in the lumber yard handling logs on light trucks. The "40" with the Load Grab is used to load packaged lumber into the mine cages. The lighter "20's" are used for general utility and warehouse jobs, and the Karry Krane is used to handle logs at the sawmill as well as for moving machinery.

The "40" is used to handle strapped packages of lumber at the sawmill. The packages are stacked, for drying, with the "75." As the lumber dries it shrinks, loosening the steel strapping. A strap tightener is then used so that the "40" can

deliver the lumber packages to the winch at the portals. This same method is also used to handle all mine shoring timber.

Anaconda uses a Hyster "40" with Load Grab attachment in an operation similar to Sullivan. All lumber used to be moved manually from the sawmill to storage, and from storage to the mine cages for use underground by the timber crew.

Mechanization Cuts Costs

These mines, in their routine but necessary handling operations, have eliminated a tremendous amount of costly and inefficient manual labor by mechanizing wherever possible.

It has been reliably estimated that 20 to 30 percent of production costs are consumed by inefficient and outdated manual materials handling—this is dead, non-productive cost that adds nothing to the value of the output, but cuts deeply into the cost of staying in business.

And any method of reducing costs, even by a mere two percent is pure profit, whether it be used in a gold mine or a warehouse.



Mining Congress speakers at the defense minerals session were (upper row, left to right) Roy A. Hardy, consulting engineer in charge, Getchell Mine, Inc.; E. H. Snyder, president, Combined Metals Reduction Co.; Jess Larson and Howard I. Young, Administrator and Deputy Administrator, DMPA; H. S. Taylor, president, Oglebay Norton and Co.; J. H. Taylor, vice president, Peru Mining Co.; (lower row) P. R. Bradley, Jr., president, Pacific Mining Co.; Frank A. Ayer, vice president, Copper Range Co.; J. B. Haffner, general manager, Bunker Hill and Sullivan Mining and Concentrating Co.; and Fay Bristol, president, Bristol Silica Co.

MINING CONGRESS GETS CALL FOR INCREASED PRODUCTION

Cooperation by government and industry to step up mine output was the theme of the recent convention of the Western Division, American Mining Congress

More production is needed—"more production of whatever mineral you produce"—was the message brought to the Western Division of the American Mining Congress at its three-day meeting held in Los Angeles, California on October 22, 23, and 24th. Calling for this speed-up in production was Howard I. Young, the newly appointed deputy administrator of the Defense Materials Procurement Agency and president of the American Zinc, Lead and Smelting Company. Mr. Young urged the mining industry to "use ingenuity to get out every ton of ore."

Several of the subsequent technical sessions of the meeting were devoted to equipment and machines now used by the mining companies to lower costs and increase output.

Some Industry Viewpoints

In response to the request for increasing production, several mining company officials outlined their viewpoints on increasing production as follows.

Roy A. Hardy, consulting engineer, Getchell Mines, Inc. and Consolidated Uranium Mines, Inc. spoke on tungsten and uranium. He pointed out the need for a more realistic price, buying stations for ores and low grade concentrates, establishment of custom mills and a centrally located chemical treatment plant, and a transportation allowance to increase tungsten production. For uranium, he urged the purchase of lower grade, down to 0.06 percent U_3O_8 material, and larger mills to process it. E. H. Snyder, president, Combined Metals Reduction Company, said that the industry defeated S. 2105 (the O'Mahoney bill). What the mining industry is trying to do now should have been done four years ago and that S. 2105 would have helped prevent today's shortages. Frank A. Ayer, vice president, Copper Range Company, said, "No more time should be lost in getting into production great deposits of strategic minerals in our own country where they are safe from sinking by bombers or subma-

rines, safe from communist domination, safe from foreign confiscation and immediately available in times of national emergency."

Hairie S. Taylor, president, Oglebay Norton & Company, reported to the group that Certificates of Necessity for five-year amortization were needed to help taconite production because capital cost per annual ton of concentrate was \$30.00 to \$40.00 versus \$3.00 to \$5.00 for direct shipping iron ore. J. H. Taylor, vice president, Peru Mining Company, urged a stable price for zinc and said that the government had done a great service to miners by the recent two cents per pound increase in the price for lead and zinc.

J. B. Haffner, general manager, Bunker Hill and Sullivan Mining and Concentrating Company, urged that zinc production be given a priority over aluminum during the power shortage in the northwest.

Fay Bristol, president, Oregon Mining Association, reported that there were 47 active chrome mine operators in northern California and



Mining expansion needs and plans were explained at the congress by the men above; (from left to right) Dr. Joseph Zimmerman, editor-in-chief, *Daily Metal Reporter*; Otto Herres, vice president, Combined Metals Reduction Co.; Lawrence Litchfield, Jr., vice president, Alcoa Mining Co.; R. T. Elstad, president, Oliver Iron Mining Co.; Z. W. Bartlett, assistant general manager, Freeport Sulphur Co.; Ira B. Joralemon, consulting engineer; S. H. Williston, vice president, Cordero Mining Co.

southern Oregon and that they all faced a difficult future because of the purchase limitation of 200,000 tons of ore and concentrates at the Grants Pass, Oregon purchase depot and the further limit of only 2,000 tons from each producer.

Both DMPA administrator, Jess Larson, and assistant administrator, Howard I. Young, assured those in attendance that early Washington consideration would be given to complaints and constructive criticism.

Mining Expansion Plans

Of prime importance to the miner is the future availability of metals and the resultant effect supply has on price. Dr. Joseph Zimmerman, editor in chief, *Daily Metal Reporter*, in commenting on these factors said that peak metal demand will be reached in the first half of 1952. He reported that foreign miners were receiving much higher prices for their products while "the domestic metal industry is being kept in a price strait-jacket by the OPS."

Expanding Mineral Supplies

The outlook for expanding minerals supply in the United States was presented in the form of a symposium of reports from leading producers of metals and minerals.

Otto Herres, vice president, Combined Metals Reduction Company, reported that zinc is now in short supply throughout the free world, a situation that will not be alleviated until 1953 even under the most favorable foreseeable effects of Government aid. Lead supplies, he added, are now critically short in this country but, because the supplies in foreign markets meet their requirements and because it is not in a class with zinc and copper as a defense material, lead has not been considered for allocation at the International Materials Conference. Though lead is now rationed by the United States government due to

shortages caused by dwindling imports, Herres continued, little increase in domestic mine production is anticipated.

Lawrence Litchfield, Jr., vice president, Alcoa Mining Company, reported that domestic aluminum production is being increased 80 percent over the size of the pre-Korean industry. He warned, however, that even this tremendous increase will not be felt immediately and aluminum will remain in short supply for civilian use until the proposed expansions are completed. Litchfield further reported that the output of magnesium will have been increased eight-fold when the six recently reactivated government-owned plants built during World War II are in full production. The immediate future is brighter for magnesium than for aluminum, he added.

R. T. Elstad, president, Oliver Iron Mining Company, reported that the iron ore industry, alert to its responsibility to furnish the needed

raw material for the expected increase in steel output in the United States, is expanding on three general fronts—in active domestic ore fields, new foreign ore fields and in the development of taconite.

Z. W. Bartlett, assistant general manager, Freeport Sulphur Company, told the assemblage that the present shortage of sulphur which has eaten our stockpiles down to one-quarter of their pre-war size will soon be mitigated by the opening of four new dome deposits in the Gulf Coast area. Foreign sulphur supplies have an equally bright future, he added, with 46 new sulphur projects underway among the free nations of the world.

Ira B. Joralemon, consulting engineer, related the pitifully discouraging outlook for mercury and chrome based, he said, on the fact that domestic mines cannot, in normal times, compete with foreign sources. "The chance of success is too slim to encourage private investors to try to find new chrome

The problems facing manganese production in the free world received considerable attention at the meeting. Discussing both foreign and domestic production plans are R. C. Osgood, production manager, Joy Mfg. Co.; V. Ramakrishna, chairman, Jeypore Mining Syndicate Ltd.; and Charles V. Brailey, vice president, Charleston Hill National Mines, Inc.



and mercury mines, or to bring idle mines to production if the investment is great." By contrast, Joralemon continued, the accomplishments in adding to domestic production of vitally needed tungsten and uranium are spectacular. Important new large-scale tungsten producers and prospects assure supplies for the future and the United States now ranks second in uranium production on the free side of the iron curtain.

S. H. Williston, vice president, Cordero Mining Company, reported that little hope exists of increasing the domestic production of manganese by the discovery of new deposits of presently suitable grade. Seemingly, he said, the only alternative available for increasing production (now less than 10 percent of requirements) is successful metallurgical research on the beneficiation of the vast low-grade deposits that are known to exist in the United States. The need for a painstaking research program is more forcefully evident, he added, when it is realized that present world production precludes stockpiling, with no assurance whatever of manganese supply in the event of war.

Great Shaft Sinking Interest

Interest in shaft sinking has been wide spread in the United States since the report of the world record Virginia No. 3 shaft sinking was published in the June and July issues of *Mining World*. A special section of the meeting was, therefore, devoted to shafts and included a review on published reports on Orange Free State, Africa sinking practices and equipment. Other pa-



Between sessions of the Mining Congress, informal groups of mining men gathered to discuss the many problems that face the minerals industry. One such group consisted of R. L. Baldwin (in dark suit), assistant to the president, Hardinge Company, Kennedy Ellsworth (with back to camera), United States Lime Products Company; G. A. Wallerstedt, district manager, Hardinge Company; and Henry Mulryan, executive vice president, Sierra Talc and Clay Company.

pers described how the Potash Company of America used European freezing methods to freeze and sink a 15-foot diameter ventilation shaft through quicksand and badly fractured water bearing sediments at its Carlsbad, New Mexico potash mine. A cylindrical section of formations 31 feet in diameter and 360 feet deep was frozen solid by circulating refrigerated brine through 28 eight-inch diameter holes drilled around the shaft location. After 48 days, the entire mass was frozen solid and the shaft was then sunk and reinforced-concrete lined within the frozen mass.

Robert L. Loufbourow, manager, E. J. Longyear Company, read a joint report by Fred D. Wright,

Frank J. Kane, and himself on methods used to overcome water problems in shaft sinking at Friedensville, Pennsylvania. The seven-compartment shaft is being sunk by Longyear under contract for the New Jersey Zinc Company. It is in the hanging wall of a zinc ore body. The country rock is a fractured, water-saturated dolomite that has been oxidized and decomposed, in part at least, to a depth of many hundred feet. Numerous connected solution cavities within the dolomite are partly or completely filled with clay. Despite elaborate pressure grouting ahead of sinking, the shaft has been flooded twice. Once from water flowing into the shaft bottom and once from the bottom of a drift on the 400-foot level. Underwater concrete plugs were poured in the shaft and drift. The shaft was then pumped out and extensive grouting placed around the plugs through long diamond drill holes. After the grout set normal sinking was resumed.

Andrew Sims, assistant general superintendent, and Lester F. Bishop, assistant research engineer, Anaconda Copper Mining Company described concrete lining of the 9-by 38-foot Kelley shaft at Butte, Montana. Removable steel forms are used with concrete placement from the bottom upward.

J. F. Buchanan, mine superintendent, Magma Copper Company reported that the 9- by 28-foot (rock section) No. 1 Sam Manuel shaft was sunk and concrete-lined 0.198 feet per man shift. The 8- by 21-foot (rock section) No. 2 shaft rate was 0.307 feet per man shift.

Rock Bolting Reported

Though metal bolts and wood pins were used for roof support in American mines as long ago as 1905, their universal utility was not recognized until recently. The present importance of rock bolting was brought out in a series of five reports in a special session of the Mining Congress.

Robert L. Sandvig presented a paper prepared by Lloyd Pollish and himself, both of the engineering research department of the Anaconda Copper Mining Company, that described in detail the extensive rock bolting recently employed in the Butte mines. According to Sandvig, the experiments and research on bolting in waste excavations have been so successful that Anaconda considers this method of ground support as applicable to igneous material as to stratified rock. They have found that bolting

Informal entertainments were offered during the evening hours to relieve the stress of the many weighty problems that faced members of the Mining Congress. Here enjoying the party given by the Western Machinery Company are Mr. and Mrs. Gordon Gould of Gordon I. Gould and Company; Arthur Sherman, director of the Liberian Bureau of Mines and Geology; and Mr. and Mrs. Max Holsinger of *Mining World*.



is adaptable to any shape of excavation and, when used with light timber, gunite, steel mats, or heavy mesh, a permanent support results that considerably reduces the size of cross-sections required in drifts, crosscuts, laterals, and the like.

S. E. Zelenkov, superintendent of the Kokomo unit of the American Smelting and Refining Company, reported similar success at Leadville, Colorado. The bolts were used largely in stopes, he continued, and records show that safety was improved, dilution was decreased, and production per man stope shift was higher in the bolted stopes.

Kirk H. Fox, partner in the Gates and Fox Company, described the use of rock bolts in construction tunnels. Considerable experience, he said, indicated that rock bolting is an excellent procedure for portaling in fractured or blocky ground and is faster and more economical than timber or steel supports.

Benton Boyd, superintendent of the Lark Section, United States Smelting Refining and Mining Company, reported on the results of roof bolting experience in the U. S. and Lark Mine at Lark, Utah. Bolting has been effective, he said, in drifts, drift intersections, and as support for collaring openings. However, he added, roof bolting in stopes has not been effective except in conjunction with timber, but tests are to be continued in stoping areas.

E. S. McIntyre, assistant superintendent, Combined Metals Reduction Company, related roof bolting experience at Pioche, Nevada. Though bolts could not replace square-set timber in stopes, he said, tests have indicated that roof bolting will make it possible to mine large areas of lower grade ore adjoining the better orebodies.

Uranium Production

Progress in uranium prospecting and production received considerable attention at the special uranium session. Important new prospects and producers were reported in the Colorado Plateau and at Grants, New Mexico. Frank H. MacPherson, manager of Colorado raw materials operation, United States Atomic Energy Commission, said, "... much has been accomplished by pilot-plant testing, exploratory work in the field, and experimental work in the laboratory, to expand the domestic production of uranium ores and concentrates, particularly in Colorado, Utah, New Mexico and Arizona." According to MacPherson, the price increases and the increased bonuses to new pro-



TOP: Discussing the gratifying increases in tungsten production are (from left to right) H. S. West, president, Haile Mines, Inc.; P. R. Bradley, Jr., (with back to camera), president, Pacific Mining Co.; W. Lunsford Long, vice president and general counsel, Haile Mines, Inc.; Carlton D. Hulin, consultant in mining geology; and Ray Golenor, vice president, Manganese, Inc. BOTTOM: Mining machinery manufacturers were well represented at the Congress with such men as W. M. Samppi, LeRoi Co., Cleveland Rock Drill Division; Robert S. Gibson, district manager, Gardner-Denver Co.; and R. H. Rodolph, special representative, LeRoi Co.

ducers announced by the Commission during the year are largely responsible for the increased activity in exploration and mining.

R. P. Fischer, project chief, United States Geological Survey, described the use of geology in guiding exploration for carnotite deposits on the Colorado Plateau. He told of the extensive work done in the area by the Survey and the exploratory drilling they have undertaken to effectively use the useful geologic features in testing broad areas not near known deposits. "The geologic characteristics," he said, "that are useful in recognizing ground favorable for ore and in guiding exploration are bedding, thickness, and color of sandstone, the abundance of altered mudstone and of carbonaceous material, and the orientation of fossil logs and ore rolls."

Thomas W. Oster, chief of the Grand Junction Exploration Branch, United States Atomic Energy Com-

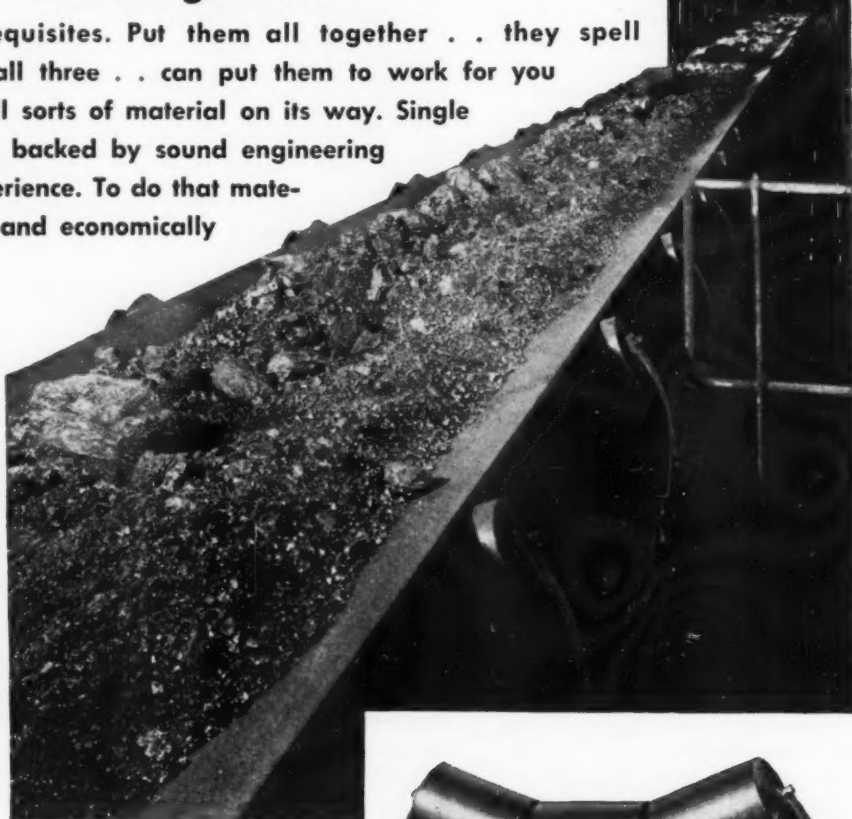
mission, reported on the progress of exploration on the Colorado Plateau. "The success of our exploration program is determined in terms of ore discovered. Although I cannot quote actual figures, I can say that results have been up to expectation. New districts have been discovered. the geographic and geologic limits extended. Ore reserves have been developed by the combined effort of Government and industry, which justify construction of new beneficiation plants."

R. G. Sullivan, vice president of the Minerals Engineering Company, related the new developments in diamond and dry-hole drilling that have been made in the large exploratory program now underway on the Colorado Plateau. "These developments should be watched carefully by the mining industry, as a whole," he said, "as a drilling program of the scope now in progress will highlight much that can be used elsewhere."

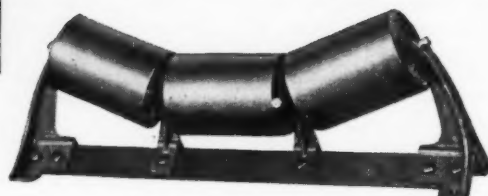
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BABOQUIVARI'S GOLDEN OWLS



In all the flaming annals of the wild and romantic borderland between the United States and Mexico there is nothing that stands out more vividly than the story of Baboquivari and the Golden Owls.

This majestic mountain peak, in southeastern Pima County, Arizona, resembles a great golden eagle with outspread wings, head and beak high in the air. It towers far above the surrounding plains and has for hundreds of years been a friendly guidepost to succeeding generations of men. The old ruins and long rows of graves in the valley below prove beyond a doubt that the country was inhabited by an ancient race not unlike those who built the great houses, the ruins of which still dot the valleys and plains of New Mexico and Arizona.

Facts, generously embroidered with fiction, are responsible for stimulating the amazing efforts which have been made to discover the treasure of Baboquivari. Prospectors and adventurers have sworn to wrest the golden image of the Sun God and the silver image of the Moon God, the buckskin bags of gold, and the ollas filled to overflowing with glittering gems, from beneath the outspread wings of the golden eagle perched high atop the mountains.

During the fight for possession of the City of Mexico, Montezuma dispatched swift runners to every part of the empire which, in those days, extended to or beyond what is now the state of Utah. They carried orders to the principal chiefs to bury all treasures in some secret place until such time as the cruel invaders had been driven from the country. According to tradition, this was done.

At Baboquivari fully 50 strong men staggered under the weight of the golden image of the Sun God while a like number bearing the silver image of the Moon God toiled up the steep mountainside toward the cave. One hundred fifty slaves dragged the great sacrificial stone made from polished dolerite. On the naked backs of 400 Indians the other treasures poured in; great plates of gold and silver, 2,000 heavy shields

fashioned from thick sheets of gold, tons of gold and silver ornaments of odd and quaint design, hundreds of buckskin bags filled with gold nuggets from the vaults of Altar, Boluda, Las Guijas, and many more. Silver, too, in large balls and slabs arrived, possibly taken from the silver deposits of Planchas de Plata.

Higher and higher grew the great heaps of gold and silver until finally, after three months of grueling labor, the treasure was all stored away in the secret cave. Then came the Indian priests carrying ollas filled with turquoise and emeralds and vases of golden beads and sparkling gems. When all had been placed within the cave, the priests made the sacrifice and sealed the entrance. Then, chanting their weird songs, they led the strange throng down the winding trail to the village below, never to return.

Then came Francisco Vasquez de Coronado and his Spaniards, and after them the Jesuit fathers who built the long chain of missions. Father Eusebio Francisco Kino, when on his way from Tumacacori or San Xavier to visit the outlying

missions of Sonoyta and Tinaja Alta, often passed in sight of Baboquivari and the secret cave. Padre Miguel Hidalgo, Mexican patriot of Dolores, Guanajuato, Mexico, rode by Baboquivari when on his way to wrest the golden realm of California from a tyrant king. Finally, after 300 years of unspeakable history, the blood-thirsty Spaniards were driven from the country. Following the war between the United States and Mexico and the Gadsden treaty, Baboquivari and the old mines in the area came under the protection of the American government.

About this time there lived in the pueblo of Tucson a wealthy Mexican ranchero called Don Miguel. Near the ancient ruins in the valley below the peak, Don Miguel erected his hacienda and maintained the usual tienda (store) where Mexicans, Indians and the few wandering whites bartered for their supplies.

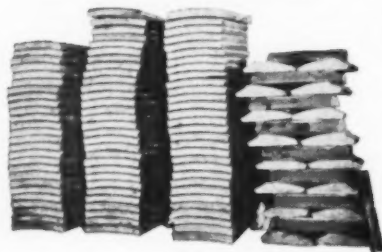
One day a feathered Papago chief rode his pinto through the great gate in the wall which surrounded the hacienda, and at the store traded a handful of gold nuggets for food. No amount of coaxing on the part of the

I made a torch from a piece of Ocotillo bark and dropped it through the small opening.



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merchant or his good wife, Dona Pepita, would induce the wily old chief to disclose the source of his wealth.

The Papago had grown up near Tumacacori and San Xavier missions and spoke Spanish fluently. He explained that there was a tradition among the Indians which prevented them from showing a lost mine or treasure to anyone outside the tribe. They had been taught, he said, that to do so meant instant death at the hands of the gods that rule over the Indian people.

When the Indian had become a very old man, he made another of his trips to the store and bartered his gold. While there he told Don Miguel that since he could not hope to live much longer he wanted to reveal the secret of the gold nuggets in return for the many kindnesses shown him and the Papago people.

"I was just a young buck," related the old chief, "and was trailing a wounded deer up the steep slopes of Baboquivari. Just before sundown I came out on a long ridge running off to the northeast of the high peak. Suddenly, my attention was attracted by a large number of golden owls. They rose from the ground flapping their wings and sailed gently down into the valley below. Never in my life had I seen so many beautiful owls at one time.

"Curious to know where they were coming from, I investigated and found they were emerging from a small crevice in the mountainside. I made a torch from a piece of ocotillo bark and dropped it through the small opening. It continued to burn on the floor of what seemed to be a large tunnel or cave. A light draft was coming through the crevice, indicating that there was another opening to the cave.

"About 200 feet from there I discovered an entrance that had been covered with large timbers and rocks. The timber had partly rotted away, exposing an opening which was being used by some small animal to enter the cave. I enlarged the entrance, secured another torch and crawled in.

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"I raised the serape from the dais and stood there as if transfixed. Before me on the cold rock slab lay two of the most beautiful little Indian girls that I had ever seen in all my life. Their coal black hair was held in place by thick bands of pure gold studded with great emeralds and turquoise. On their upper and lower arms were flowered bands of gold, and their throats were circled with long strands of gold beads with emerald pendants. Fringed aprons of white buckskin reached halfway to the knees and golden sandals adorned their feet.

"I gently replaced the serape over the little princesses and made my way slowly to the entrance. On the way out, I picked up one of the small buckskin sacks filled with nuggets. I did not think that those hideous gods would object to a poor Indian like myself taking a few handfuls of all that gold so that he could purchase food for himself and his squaw.

"When I had closed the entrance I made my way down the steep trail to the village below and hid the gold beneath the dirt floor of my tepee. It was from that sack that I got the gold I brought to you to pay for food," he concluded. "Go to the mountains and climb up the long ridge. Just before sundown, when you see a large number of golden owls in the air, you will know that you are near the treasure."

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MINING WORLD

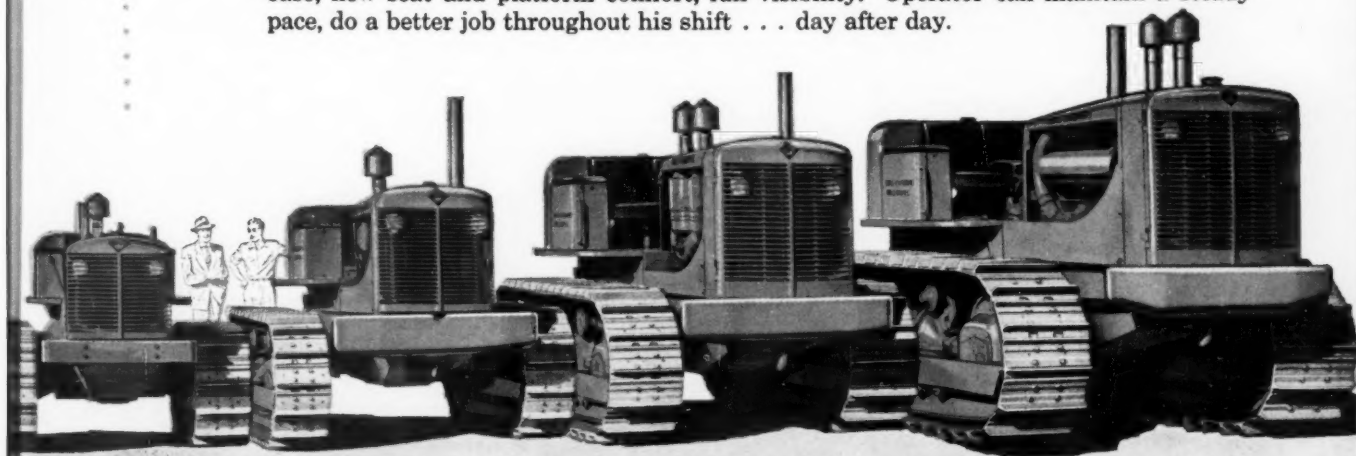
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HD-5

40.26 drawbar hp.
11,250 lb.

HD-9

72 drawbar hp.
18,800 lb.

HD-15

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27,850 lb.

HD-20

Hydraulic Torque Converter Drive
175 net engine hp. 41,000 lb.

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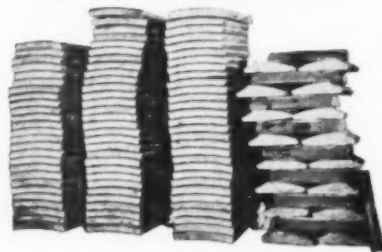


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merchant or his good wife, Dona Pepita, would induce the wily old chief to disclose the source of his wealth.

The Papago had grown up near Tumacacori and San Xavier missions and spoke Spanish fluently. He explained that there was a tradition among the Indians which prevented them from showing a lost mine or treasure to anyone outside the tribe. They had been taught, he said, that to do so meant instant death at the hands of the gods that rule over the Indian people.

When the Indian had become a very old man, he made another of his trips to the store and bartered his gold. While there he told Don Miguel that since he could not hope to live much longer he wanted to reveal the secret of the gold nuggets in return for the many kindnesses shown him and the Papago people.

"I was just a young buck," related the old chief, "and was trailing a wounded deer up the steep slopes of Baboquivari. Just before sundown I came out on a long ridge running off to the northeast of the high peak. Suddenly, my attention was attracted by a large number of golden owls. They rose from the ground flapping their wings and sailed gently down into the valley below. Never in my life had I seen so many beautiful owls at one time.

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MINING WORLD

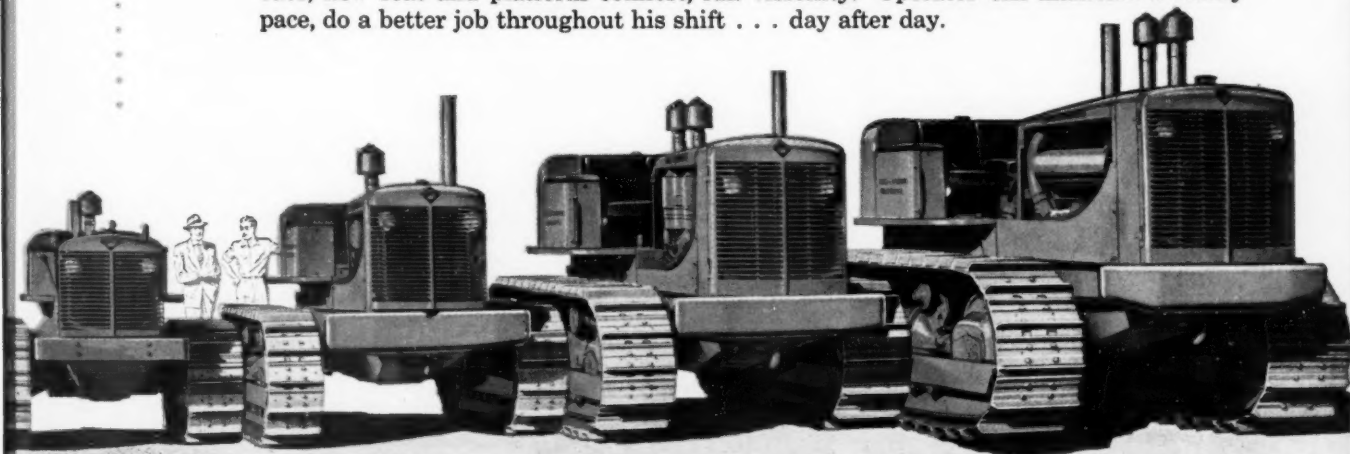
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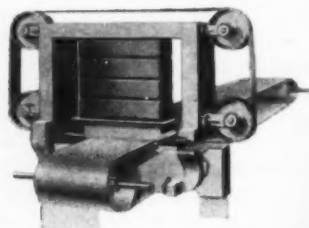
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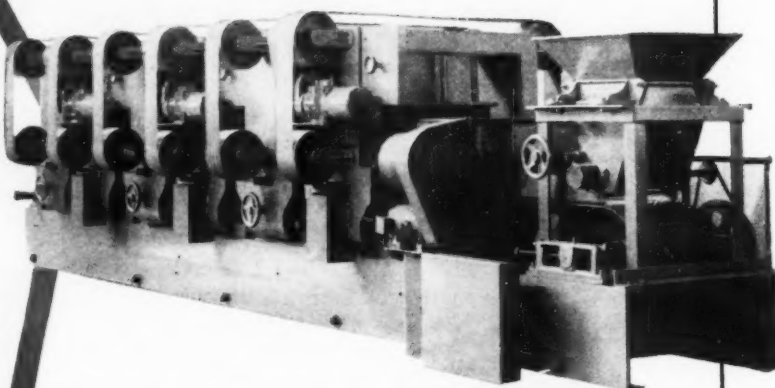
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Monazite • Chromite
Garnet • Wolframite
Hubnerite • Ferberite
Pyrrhotite • Manganese
and similar weakly magnetic
materials



OPERATION: Material to be separated is carried on the main belt conveyor under a series of magnet and cross belt assemblies. Magnetic particles are attracted to the underside of the moving cross belt which sweeps them to the side to be separately discharged. Each magnet assembly can be adjusted to remove a desired magnetic fraction. Any number of cross belts depending on the number of materials to be separated can be provided.



Dings New Cross-Belt Type EBK Magnetic Separator Produces Highest Grade of Magnetic Concentration Obtainable

MORE selectivity and greater capacities in the concentration of magnetic ores than were heretofore possible are now obtainable with the new Dings Cross-Belt Magnetic Separator. Here are typical examples: A tungsten mining company in N. Carolina recovers 98% of a 72.2% grade WO_3 in their hubnerite ore. In McCall, Idaho, a 6 Cross Belt unit produces 550 lbs. of monazite concentrate per hour at 99.1% purity from an estimated feed of 2500-3000 lbs. of sand per hour.

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GREATER CAPACITY. New pole nose construction gives separating capacity about double that of any previous design. Hence with this improvement, a smaller, less expensive unit will often handle requirements. For example, under certain conditions, a new 3 Cross Belt Unit installed to concentrate manganese will do the work of a 6-belt unit of the old design.

GREATER SELECTIVITY. Each Cross Belt assembly is individually energized. The ability to make an extremely fine adjustment to each Cross Belt without affecting any other permits a degree of selective separation not possible in previous machines. A variable speed main belt drive further contributes to extreme selectivity.

EASIER MAINTENANCE. Dust sealed, anti-friction bearings are used throughout. Cross belts can now be replaced without dismantling machine.

SIMPLER OPERATION. Only one adjustment—varying the air gap—allows unit to handle various rates and qualities of feed to effect a given separation. Turning a stud, calibrated in thousandths of an inch, adjusts the air gap. Previous settings can be duplicated in seconds.

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Strength

ACTIVITIES OF U. S. MINING MEN

Nelson C. White, former assistant manager of the Carlsbad plant of International Minerals & Chemical Corporation, has been made general manager of the Potash Division. He also will be vice-president of the recently absorbed Innis, Speiden & Company.

J. M. Madsen has been appointed chief engineer for the W. S. Moore Company. He has recently been connected with A. H. Neumann and Brothers, and is a former construction engineer for Butler Brothers.

Harry J. Wolf, who has been examining sulphur deposits in Wyoming, has returned to his New York office.

Joseph H. Mader is now director of public relations for Reserve Mining Company. Until recently, he has been with the American Petroleum Institute as editorial director.

Tom Evans, mining engineer for the Atchison, Topeka, and Santa Fe Railway Company, has returned to his Los Angeles headquarters following nearly a year's absence. During the past year, he has supervised the extensive sampling and evaluation job for the Railway Company in its Grants, New Mexico uranium deposits.

Russel B. Wortley, Iron River, Michigan, has retired from the M. A. Hanna Company after 38 years of service. Mr. Wortley was superintendent of the Hiawatha mine, No. 1 and 2 shafts. A graduate of Michigan College of Mining and Technology Mr. Wortley joined the M. A. Hanna Co. in 1913 as an engineer. **Duane S. Meyers** will replace Mr. Wortley. Mr. Myers was formerly superintendent of the Ozark Ore Company mine at Arcadia, Missouri.

W. E. New of Hailey, Idaho, was elected president of the Idaho Small Mines Association at their annual convention held at Hailey the latter part of October. **E. G. Taylor**, Boise, is the new vice president; **Floyd Sherry Jr.**, Hailey, secretary; and **Rex Shirts**, Hailey, treasurer.

H. F. Mills, general superintendent of American Zinc, Lead and Smelting Company's Grandview operation at Meteline Falls, Washington has been promoted to the position of Western Geologist. He will be in charge of all mine examinations, exploration and development work in the western United States and western Canada. His headquarters will continue to be at Meteline Falls. His assistants will be **Edward L. Johnson** and **Bernard I. Bittman**. **John W. Currie**, who has been mine superintendent, will be promoted to general superintendent to succeed Mr. Mills. **Claude L. Sage**, former general mine foreman, will be mine superintendent, and **Otis Hagberg**, now night mine foreman, will be general mine foreman.

Robert Henderson and **Charles A. Cleaves**, both former Climax Molybdenum Company employees, have joined the Mining Division of E. J. Longyear Company. Mr. Henderson was assistant mine superintendent and mine superintendent at Climax, and then a consultant on mining problems particularly those related to handling large tonnages by slushing. Mr. Cleaves has a background of operating and engineering experience at Climax,

and shorter periods of mining, diamond drilling and operating in Nevada and California.

Arthur Montgomery, owner and operator of the Harding beryl mine at Dixon, New Mexico, is now a professor of geology at Lafayette College, Pennsylvania.

J. J. Beeson, Salt Lake City, has been retained as consulting geologist to report on the property in the Alta district of Zenda Gold Mining Co.

Ralph G. Detmer has been appointed vice president of the Trackwork Division of Taylor-Wharton Iron & Steel Company. He will coordinate all phases of the corporation's trackwork operation.

R. C. Haworth, former assistant resident manager, is now resident manager of the Potash Company of America's Carlsbad operation. He succeeds **P. S. Dunn**, now working in California for the American Potash and Chemical Company.

Frank J. Walsh, former Tacoma, Washington civil engineer and contractor, has joined the Spokane organization of **Frank Eichelberger**, nationally known mining engineer. Walsh will be in charge of constructing a silica sand processing plant at Springdale, Washington.

R. M. Meen has been promoted from foreman to superintendent of the Calera Mining Company's Blackbird mine at Cobalt, Idaho. **R. L. Soderberg**, formerly research engineer, is the Blackbird's new mine foreman.

Sam S. Coldren is the new mine superintendent for Blythe Manganese Com-



ROBERT L. BURNS has recently joined the staff of *MINING WORLD* as Field Editor. He was born and raised in Montana and, after completion of high school, was employed as an oil refinery chemist. Later he attended Montana School of Mines and, after an interruption for military duty as a Marine Corps radio-relay technician in the Pacific theater, graduated in Mining Engineering. He has worked as a surveyor for the U.S. Bureau of Reclamation; a mining engineer trainee for the Oliver Iron Mining Company in Hibbing, Minnesota; and as a staff member of the Orinaco Mining Company in Ciudad Bolivar, Venezuela. When he returned to the United States after two years in South America, he attended Stanford University and received the degree of Master of Science in Mining Engineering.

WILLIAM A. WHITE, SR., has been appointed director of the Miscellaneous Metals and Minerals Division of the National Production Authority. **Harry B. Sharp**, who has been acting director, will remain as deputy director. Mr. White's experience in the mineral field dates back to 1916 when he served as treasurer of Charles Hardy, Inc. His most recent association was with the Union Mines Development Corporation and the Electro-Metallurgical Company of New York.



pany, Blythe, California. The company is completing a 200-ton per day treatment plant which is scheduled for operation this month. **L. R. Blessing** is company manager.

Robert O. Giroux has taken over his new duties as mine superintendent of the Antler Mine in Yucca, Arizona, for the Yucca Mining and Milling Company. For the past two-and-one-half years, he had been with the Ray Mines Division of Kennecott Copper Corporation in Ray, Arizona.

H. W. Gillespie, personnel director of the Inter-State Iron Company, since 1946, has been appointed assistant superintendent of the Columbia, Schley, Pettit, and Wentworth mines of which **Paul W. Kruse** is superintendent. **Richard H. Hanson**, mine industrial engineer for the past year, has been made personnel director to succeed Mr. Gillespie. **C. E. Dickens**, supervisor of employment and training, has been appointed mine industrial engineer, and **LeRoy Nelson**, safety inspector, will be the new supervisor of employment and training.

Ex-president **Herbert Hoover** has been awarded the Howard Conley Medal of the American Standards Association for long and outstanding service in advancing the national economy through voluntary standards.

Charles C. Rieth, chief of the Tin, Lead, Zinc Section, Metals Branch, Office of Price Stabilization, presided at a recent meeting of the Primary and Secondary Zinc Smelters and Refiners Industry Advisory Committee in Washington, D. C. Among those representing industry on this committee are **H. D. Carus**, Matthiessen & Hegeler Zinc Company, LaSalle, Illinois; **Clarence Glass**, Anaconda Sales Company, New York; **Charles R. Ince**, St. Joseph Lead Company, New York; **D. H. LeFevre**, U.S. Smelting, Refining & Mining Company, New York; **Raymond F. Orr**, Athletic Mining & Smelting Company, Fort Smith, Arkansas; **J. S. Schwartz**, Pacific Smelting Company, Torrance, California; **Marshall L. Havey**, The New Jersey Zinc Company, New York; **R. E. McCormack**, Eagle-Picher Mining & Smelting Company, Miami, Oklahoma; **E. H. Snyder**, Combined Metals Reduction Company, Salt Lake City; **Simon D. Strauss**, American Smelting & Refining Company, New York; **Jean Vuillequez**, American Metal Company

ROY H. GLOVER of Butte, Montana, has been named vice president and general counsel of Anaconda Copper Mining Company, and also a member of the board of directors. He assumes the position formerly held by W. H. Hoover, now president of the company. Mr. Glover, who has been serving as western general counsel of Anaconda since 1945, is also general counsel for the Montana Power and Light Company, and director of a number of firms. Clark S. Judd of Waterbury, Connecticut, has resigned as a member of the board.



Ltd., New York; **H. I. Young**, American Zinc Company of Illinois, St. Louis; and **Kurt Weinberg**, National Zinc Company, Inc., New York.

The following promotions in the Cleveland Cliffs Iron Company have been announced. **Stanley W. Sundeen**, Ishpeming, who has been a geologist and recently superintendent of the Cliff Shafts mine, has been appointed assistant manager under C. W. Allen, general manager. Mr. Sundeen will be in charge of a special program on investigation, development, and research of new properties. **Onnie Marjama**, superintendent of the Lloyd and Spies mines will now be superintendent of the Lloyd and Cliffs Shaft mines, and **T. A. Kauppila**, mining engineer of the Spies, will be assistant superintendent at that property. **Robert M. De Gabriele** will be operating mining engineer at the Cliffs Shaft and Lloyd mines, and **Carl Christianson** will be underground foreman at the Spies. **Emert W. Lindroos**, metallurgist, has joined the staff of the firm's ore research laboratory at Ishpeming; **Kenneth H. Johnson**, has joined the geological department; and **Robert G. Fountain**, civil engineer, is now with the engineering department.

Kenneth Nichols has been promoted to assistant foreman in the refinery of International Minerals and Chemical Corporation, Carlsbad, New Mexico. He replaces **Marvin Bourn** who has resigned to accept a position with Duval Sulphur and Potash Company.

Earl F. Blank, former head of public relations at Jones & Laughlin Steel Corporation, has been appointed special assistant to the vice president of employee and public relations. He will be succeeded by **John D. Paulus**, former senior account executive of Ketchum, Incorporated.

W. G. Sandell, formerly of McGill, Nevada, has been made general superintendent of the Old Hundred mines and mill in Cunningham Gulch, near Silverton, Colorado. **Ben F. Webster, Jr.**, will continue as general manager of the Old Hundred Gold Mining Company.

Harold O. Davidson has joined the engineering staff of Zontelli Brothers at Ironton, Minnesota. He had formerly been with the engineering department of Oliver Iron Mining Company.

F. T. Quiett is now with New World Exploration, Research and Development Corporation in Reno, Nevada, after completing his work for Master's degree in Geology at the Colorado School of Mines.

Herbert Z. Stuart has been transferred to the New York office of Phelps Dodge Corporation as resident engineer of mines. He had previously been chief engineer of the Copper Queen Branch at Bisbee, Arizona.

Robert M. Lloyd has been elected vice president—raw materials of United States Steel Company. Mr. Lloyd joined U.S. Steel in 1926 as an employee in the Sales Department of the Carnegie-Illinois Steel Corporation. He transferred to the Raw Materials Department in 1933 and after several promotions was made assistant director of raw materials for that company. He was appointed assistant to the vice president of the former U.S. Steel Corporation of Delaware in December 1945, and became assistant vice president of U.S. Steel Company on January 1, 1951.

Dr. J. Harlan Johnson, professor of geology and curator of the mines museum at the Colorado School of Mines, has returned to his duties after a tour of mandated islands in the Pacific area for the United States government. Dr. Johnson worked with the Pacific Geologic Surveys, a branch of the engineering section, Far Eastern Command. He visited Japan, Okinawa, Guam, Saipan, and Tinian.

Obituaries

Walter Lyman Brown, president of Carson Hill Gold Mining Corporation, and vice president and general manager of Knob Hill Mines, Inc., died in Carmel, California, September 5. Mr. Lyman's mining career began in 1903 when he graduated from the University of California. He gained his practical experience in such parts of the world as Mexico, Alaska, and South Africa. He joined the Commission for Relief in Belgium in 1916 and was subsequently decorated for this work by the French, Belgium, Austrian, and Polish governments. Mr. Brown was a member of the American Institute of Mining Engineers and the Mining and Metallurgical Society of America.

C. S. J. Trench, 71, editor and publisher of "American Metal Market" since 1929, died in Staten Island, New York, August 20. Mr. Trench was the first president of the American Tin Trade Association, and at various times served on committees of the New York Metal Exchange, the Commodity Exchange, and the American Tin Trade Association. He was also an associate member of the American Zinc Institute, the American Institute of Mining and Metallurgical Engineers, and the American Iron and Steel Institute.

Garnett Alfred Joslin, 68, well-known consulting mining engineer, died in Mexico, September 20. Mr. Joslin opened a consulting office in Los Angeles in 1927, after many years in Ontario, Venezuela, Mexico, Chile, and parts of the western United States. In 1947 he moved to Mexico where he served as manager of Towne Securities Company until his death. He had been chairman of the Southern California section of the American Institute of Mining and Metallurgical Engineers in 1939, and president of the Mining Association of the Southwest from 1938 to 1940.

Carl Arthur Lemke, 70, former superintendent of the United States Smelting, Refining and Mining Company at Midvale, Utah, died in Salt Lake City August 1. Mr. Lemke was a graduate of the Colorado School of Mines and taught mathematics there. He was associated with United States Smelting Refining and Mining Company for 22 years. Later, he became superintendent of the Potash Company of America at Carlsbad, New Mexico. He retired from that job because of ill health.

James O. Greenan, 63, widely known mine operator, died in Reno, Nevada, July 23. Before World War II, Mr. Greenan had been with the Marsman Company in the Philippine Islands. He returned to the United States when war conditions necessitated and operated the Majuba copper property near Inlay, Nevada. His most recent project was Greenan Placers at Battle Mountain, Nevada.

Leslie Douglas Anderson, 72, consulting engineer for the Potash Company of America at Carlsbad, New Mexico, died July 31 in Salt Lake City, Utah. Mr. Anderson had been with Potash since 1933, first as chief engineer and then as consulting engineer. Before this, he had had a long and successful career with the United States Smelting, Refining and Mining Company. He had been superintendent of the Midvale smelter and later chief engineer of operations in the United States, Alaska, and Mexico.

John P. Bickell, 66, Canadian mining financier, died in New York August 22 while on a trip from Toronto. One of the wealthiest men in Canada, Mr. Bickell had at one time been president of three mining companies. The largest of these was McIntyre-Porcupine Mines Ltd., a major gold producer with mines in northern Ontario. He was also a director of International Nickel Company, the Canadian Bank of Commerce, and several other Canadian firms.

Jacob Schoder, 62, metallurgist and long-time associate of Frank Eichelberger, Spokane mining engineer, died in Spokane September 8. Mr. Schoder had worked for St. Joseph Lead Company in Argentina before becoming associated with Mr. Eichelberger in 1931 at a Base Metals Mining Company operation in Field, British Columbia. Together they built 16 plants, including metal concentrating mills, electro-chemical plants, and chemical plants in Washington, Idaho, Montana, Utah, Colorado, Arizona, and Canada. Mr. Schoder had just finished designing a processing plant for the Springdale Silica Sand Company and was working on the design of a tungsten mill for American Alloy Metals, Inc.

Chester A. Fulton, a mining engineer and former president of the American Institute of Mining and Metallurgical Engineers and of the Southern Phosphate Corporation, died in Baltimore August 16. He was 67.

C. L. Best, 73, chairman of the board of the Caterpillar Tractor Company, died in San Francisco on September 22. A pioneer inventor and tractor builder, he was one of the founders of Caterpillar Tractor Company.

Allan Kenneth Muir, general manager of Giant Yellowknife Gold Mines Limited, with properties in the Northwest Territories of Canada, died on September 17.

George Grice Sherwood, 60, vice president, secretary, and treasurer of Kaiser Aluminum & Chemical Corporation, died suddenly in September, in Oakland, California.

George R. Watson, 67, a consulting engineer for Bucyrus-Erie Company, died suddenly in Waukegan, Illinois, on October 1. As chief engineer and president of the Armstrong Manufacturing Company, and, later, as chief engineer, and then consulting engineer for Bucyrus, Mr. Watson was a recognized authority on the latest drilling procedures and methods to be employed in the blast hole drilling field.

ACTIVITIES OF INTERNATIONAL MINING MEN

The United States Steel Corporation's subsidiary Orinoco Mining Company has organized its Venezuelan staff in preparation for the construction required to mine and transport the iron ore from its Cerro Bolivar properties. **G. G. Lancaster** is now resident manager—Venezuela; Lancaster was formerly assistant to chief engineer for the Chesapeake and Ohio railroad. **Morgan Leonard**, formerly with Braden Copper Company in Chile, has been moved from project engineer—Venezuela, to operating mining engineer—Venezuela. **Russell R. Bryan, Jr.**, formerly geologist, is now the mine supervisor at Cerro Bolivar. Before coming to Venezuela, Bryan worked for the United States Smelting, Refining, and Mining Company in Mexico. **Folke H. Kihlstedt**, former manager of operations in Venezuela, is in the New York offices coordinating plans for construction and mining.

A. K. Denmead has been appointed assistant chief government geologist for the Queensland (Australia) Department of Mines.

R. J. Beggs, formerly chief engineer for the Kerr-Addison Gold Mines, Ltd., has joined the staff of Steep Rock Iron Mines Ltd., as assistant superintendent of underground mining at the Steep Rock mine in Ontario.

R. Sholto Douglas has been appointed mill superintendent of the Acoje Mining Company, Inc., at Santa Cruz, Zambales, Philippine Islands. Mr. Douglas has been a consultant and technical advisor on mining problems for many years. His most recent assignments were with the Chosun Mining Development Corporation in Korea, and as metallurgical advisor to the Kingdom of Saudi Arabia.

W. E. Sinclair of Johannesburg, South Africa, made a recent visit to East Africa in the interests of a London group. His address in Kenya is in care of Standard Bank of South Africa, Nairobi, Kenya.



H. E. MUNN, photographed at Parafield Aerodrome, Adelaide, South Australia, after flying over for the board meetings of Northern Drillers Pty., Limited, and Home of Bullion Mines. Pty., Limited, two Northern Territory

companies of which he is chairman of the board of directors. Mr. Munn is also mining consultant for Mount Morgan Limited, New South Wales.

Dr. H. G. Raggatt has been appointed secretary of the Australian Department of National Development, succeeding Commander **R. G. Jackson** who is returning to England. Dr. Raggatt is at present director of Australia's Bureau of Mineral Resources.

E. J. Kneebone, formerly with the Atok Gold Mining Company, Baguio, Philippine Islands, has joined the Benguet Consolidated Mining Company, also in Baguio, as engineer.

Victor Leferrer, head of the metallurgical department of France's largest lead

and zinc smelting company, is head of a delegation of French mining and metallurgical engineers brought to the United States by the Economic Cooperation Administration to obtain information by which to improve their home plants and increase efficiency. Included in the group are **Albert Alaux**, **Remy Dubar**, **Jean Ducros**, **Andre Fauconnier**, **Antoine Martinex**, **Jean Paelowski**, **Rene Simonet**, and **Aime Theron**.

W. M. Billingham is returning to New Zealand after attending the Missouri School of Mines in the United States.

Sir Ernest Oppenheimer, **W. A. Olgers**, **Sir Ellis Robins**, **H. Vivian Smith**, and **H. F. Oppenheimer** were re-elected to the board of directors of Rhodesia Broken Hill Development Company, and Nchanga Consolidated Copper Mines, Ltd., also in Rhodesia. **Mr. K. Richardson** was also re-elected a director of the latter group, while **H. Rissik** was elected a new director of the organization.

Arnold H. Miller, consulting engineer in New York, made a survey of the fluorspar production in Japan, India, Egypt, Spain, France, and Germany.

Robert W. Hooper has left Broken Hill, New South Wales, and is now chief surveyor for Central Norseman Gold Corporation N.L., in Norseman, Western Australia.

M. A. Jorgenson has returned to the United States as mill superintendent of the new Triumph mill at Triumph, Idaho. Mr. Jorgenson spent many years in Newfoundland as mill superintendent at the Buchans Mining Company's property.

Rolf H. Hanson is now with Mina el Dorado, San Isidro, Department of Cabanas, El Salvador, Central America.

Manuel de Bettencourt, who received his Master's degree in Geology from the Colorado School of Mines this year, has returned to Lourenco Marques, Portuguese East Africa. He will resume his position as geologist for the government's Geological Survey.

Lewis J. Nonini has been appointed head of the mining division of a panel of technical consultants set up by the United Nations' Korean Reconstruction Agency to aid the South Korean government in long-range rehabilitation programs. He has been in Korea for several years as mining engineer and consultant with the Economic Cooperation Administration. Mr. Nonini is from Wallace, Idaho.

G. H. Bannister, formerly chief engineer, Electrolytic Refining and Smelting Company of Australia Pty. Ltd., at Port Kembla, New South Wales, has been appointed assistant engineer of Malcom Moore Industries Ltd., in Port Melbourne.

Among those attending the World Metallurgical Congress in Detroit, Michigan during October and the Study Tours for four weeks prior to the meeting were **Dr. Pierre Van Der Rest**, general manager of the Belgian Blast Furnace and Steelworks Association, Brussels, Belgium; **Dr. Pierre Coheur**, director of the National Center for Metallurgical Research, Liege, Belgium; **Dr. Howard Knox Worner**, representing the Australian Institute

CHARLES WILL

WRIGHT and associates have formed a new company, Impulsora Minera De Mexico, S. A., with headquarters in Mexico City, D. F. The company plans to develop mining properties in Mexico. Of particular interest to date have been manganese, iron and fluorspar deposits. Wright is a well known specialist on foreign mines and makes his headquarters in Washington, D. C.



of Mining and Metallurgy and the Australian Institute of Metals; **Ernest George Thurlby**, superintending metallurgist, Defense Research Laboratories, Australia; **Dr. Franz Repatz**, representing Eisenhutte Osterreich, Leoben, Austria; **Hubert F. O. Hauttmann**, manager of research for United Austrian Iron and Steel Works, Linz, Austria; **Sir William Griffiths**, vice president of International Nickel Company of Canada; **Tokushichi Mishima**, past president of the Iron and Steel Institute of Japan; and **Sir J. J. Chandy**, director of Tata Industries Limited, Jamshedpur, India.

Dr. Eero Makinen, consulting mining engineer and general manager of the Outokumpu Oy in Finland, has received the highest distinction of the German Society of Furnace and Mining Operators—the George Agricola Medal. Since 1921, Dr. Makinen has extended and improved the largest mining works in Finland, which at present produces more than 20,000 tons of copper, as well as sufficient sulphur for the Finnish cellulose industry, and supplies nickel, gold, silver, zinc, selenium, silver nitrate, copper sulphate, nickel sulphate, and iron. The medal was presented at the General Assembly of the society in Hamburg.

John F. Johannsen, export manager of Hyster Company, Portland, Oregon, attended the Fifth Pan American Highway Congress at Lima, Peru, as a United States observer. The United States was invited to be represented by official delegates and observers in compliance with rules approved by the Inter-American Economic and Social Council.

United States delegates to the International Tin Study Group meeting in Rome, were **Clarence W. Nichols**, acting special assistant of International Materials Policy for the State Department; **Harlan P. Bramble**, acting chief of Metals & Minerals Division of the State Department; **E. Allen Fidel**, from the U. S. Embassy in Rome; **Morris Foodim**, Federated Metal Division, American Smelting & Refining Company; **Charles Merrill**, chief of Metals, Economics Branch, Bureau of mines; **Herbert O. Rogers**, head of the Tin, Lead, Zinc division, National Production Authority; **Spencer S. Shannon**, special assistant to the administrator of the Reconstruction Finance Corporation; **Anthony Siragusa**, assistant to the vice president of the U. S. Steel Company; and **Thomas B. Wilson**, Brigadier General, U.S.A.R., special consultant to the administrator of General Services Administration.



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INTERNATIONAL NEWS

IMC Allocates Cobalt and Nickel for Fourth Quarter

The International Materials Conference has allocated cobalt and nickel and their oxides and salts to 32 countries for the fourth quarter of 1951. The Conference had requests for 4,000 metric tons of cobalt, against estimated "Free" world production of 2,075 metric tons. Nickel requests were 56,800 metric tons, against expected production of 31,500 metric tons. Governments of the following countries were represented at the meetings: Belgium (representing Benelux), Brazil, Canada, Cuba, France, the Republic of Germany, India, Norway, the Union of South Africa, the United Kingdom, and the United States.

FOURTH QUARTER ALLOCATIONS

Country	Nickel (Metric Tons)	Cobalt
Argentina	10.0	2.5
Australia	197.0	13.3
Austria	225.0	20.0
Belgo-Lux. Econ. Union	108.5	26.0
Brazil	50.0	5.1
Canada	750.0	29.3
Colombia	2.5	0.1
Denmark	22.0	4.2
Egypt	0.6	—
Finland	24.0	0.4
France	1,461.0	75.0
Germany	1,425.0	127.5
Greece	2.0	—
India	245.0	14.1
Italy	265.0	14.5
Japan	485.0	60.4
Mexico	8.0	0.8
Netherlands	66.0	39.8
Norway	68.0	3.7
New Zealand	3.0	14.6
Pakistan	0.5	—
Portugal	4.0	0.4
Southern Rhodesia	0.7	0.2
Spain	50.0	5.0
Sweden	736.0	42.2
Switzerland	113.5	1.9
Turkey	5.0	1.4
Union of South Africa	16.0	5.2
United Kingdom	5,088.0	329.1
United States	19,690.0	1,212.4
Uruguay	2.5	—
Yugoslavia	30.0	0.5
Totals	31,153.8	2,049.6

Imported Dredge to Dig Canadian Ore From Lake

A 900-ton seagoing dredge is being used by Construction Aggregates Corporation of Chicago at the property of Steep Rock Iron Mines Limited to strip some 50,000,000 cubic yards of lake bottom silt from above a second large iron deposit at Steep Rock Lake, Ontario. The 30-inch electric hydraulic dredge, formerly "Nebraska," and now re-christened "Steep Rock," was towed from New York to Boston where it was disassembled and shipped by rail some 1,500 miles to Steep Rock Lake. After re-assembly in an improvised drydock at Steep Rock Lake, now virtually dry, it dug its own operating pool. The "Steep Rock" is now removing silt from the lake bed at a rate of as much as 2,000,000 yards per month.

The cost of this gigantic, three-year dredging project is amply justified by

the very large volumes of ore underlying the silt in the lake bed. The Steep Rock mine, which has been producing about 1,250,000 tons of ore annually, is expanding its output to over 3,000,000 tons annually and is considering possible further expansion through the opening of other known deposits on the company's property.

National Lead To Expand Metal Output for DMPA

The National Lead Company of New York will spend \$5,000,000 to expand its facilities at Fredericktown, Missouri, and to build a cobalt, nickel, and copper separation plant there. This is part of an agreement made with the Defence Materials Procurement Agency for increased production of those three metals.

For the next five years, the Government has agreed to buy the cobalt for \$1.845 a pound, the nickel for \$0.474 a pound, and the copper for \$0.214 a pound. During that time, the DMPA expects to get 6,930,000 pounds of cobalt, 9,261,000 pounds of nickel, and 7,087,500 pounds of copper from the facilities. In addition the Government is financing the expansion through an advance that is to be repaid in 20 equal installments at 4 percent interest annually.

The new plant is expected to be in operation within 18 months, and will process 50 tons daily. The plant has been made commercially feasible by the development of a new process for recovery of cobalt.

Commonwealth Nations To Increase Metals Output

An agreement was reached at the Commonwealth and British Colonial Territories Conference on the need for increased production of certain raw materials.

As a result, it is reported that Australia will increase production of copper, zinc, lead, aluminum, and steel, while Canada will supply more steel to Britain. Northern Rhodesia is said to be expecting to produce more copper, in view of Southern Rhodesia's agreement to increase coal supplies and transportation facilities. Southern Rhodesia will also increase output of tungsten, chromium, and asbestos. Uganda is to increase production of copper and sulphur, while Tanganyika will produce more nickel. British East Africa is expected to supply more copper.

Anaconda Copper To Build Huge Aluminum Plant

Anaconda Copper Mining Company has taken over Harvey Machine Company commitments for construction of a \$46,000,000 aluminum metal-producing plant at Kalispell, Montana. Its purchase agreement includes the Harvey contract

for power from the government-owned Hungry Horse dam.

The new plant will have an estimated initial capacity of 54,000 tons of aluminum metal annually. Alumina requirements will come from other companies in the United States; Anaconda does not plan to construct an alumina plant, nor will it build ore boats as Harvey had intended.

Anaconda will finance the project without government funds, although the company expects to receive a certificate of necessity entitling it to accelerate amortization of construction costs. Anaconda also plans to form a new Montana company to operate the plant; Harvey will have a small interest in it.

Italy Seeks Promising Sulphur Deposits

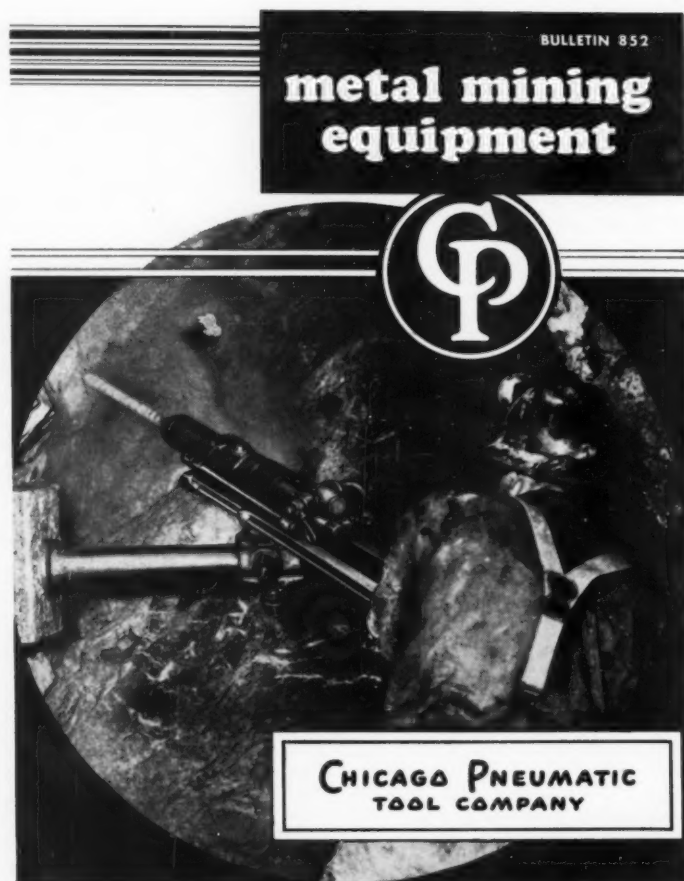
Development of the country's sulphur resources is a subject of great concern to the Italian government. Reserve supplies amount to only 6,000,000 tons, barely enough for four years' production at the present rate of 1,400,000 tons a year. There is a pressing need for investment of adequate capital in a large-scale program of survey and research of new deposits.

The Ente Zolfi Italiani, the government agency in charge of sulphur output, has made an agreement with regional authorities to carry out an exploration program for sulphur deposits both in the well known producing "sulphur area" of Central Sicily (provinces of Caltanissetta and Agrigento) and in the southern part of the Trapani province. Private concerns are also active in the Agrigento-Caltanissetta area and are reported to have already located some promising deposits.

In addition to that in Sicily, exploration work has been recommended in the regions of March and Romagna in Central Italy. Large-scale geological research has been started by the Montecatini Company in the area, including the Valleys of the Marsecchia and Foglia Rivers in southern Romagna and northern Marche. However, many deposits located there recently, by other groups, have proven to be only of limited and superficial nature. Many minor mines have closed down and at the present time only four (Cabernardi, Pecozone, Perticara, and Formignano) are still active despite high operating costs.

Diamond Drill Symposium In April In Johannesburg

The Chemical, Metallurgical and Mining Society of South Africa, in cooperation with the Diamond Research Laboratory, is sponsoring a symposium on diamond drilling in Johannesburg on April 21 through 23, 1952. Following the technical sessions, inspection trips will be made to the gold and diamond mines of South Africa and the copper mines of Northern Rhodesia. Mining men from all parts of the world are invited to attend.



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INTERNATIONAL



OCEANIA

PHILIPPINES—The \$2,500,000 steel mill ordered by *National Shipyard and Steel Corporation* will be installed at the site of the Maria Christina hydroelectric power plant in Mindanao. Delivery of steel rolling machinery valued at \$2,000,000 is expected within 12 months. Mill operation should begin toward the end of 1952.

NEW SOUTH WALES—*Broken Hill Proprietary Works* in Newcastle is expanding. A new battery of coke ovens will be installed at a cost of £A 4,000,000 to be followed by construction of another blast furnace and a rolling mill.

NEW ZEALAND—New Zealand's sulphur resources have been surveyed, and the total pure sulphur content of some 13 deposits in the North Island has been assessed at approximately 16,300 tons. The element occurs mixed with pumice and other impurities. The country used 73,000 tons of sulphur in 1950 so even if domestic sulphur were recovered at any cost, the effect on national economy would be insignificant.

WESTERN AUSTRALIA—Increased interest is being shown in the mineral resources of this state. In the Pilbara district 70 miles south of Port Headland, on the north coast of Western Australia, interest in beryl prospecting is expected to result from an increase in the price of beryl ore which was mined to a considerable extent during the war. The Pilbara field has for 25 years been the world's major source of high-grade tantalite. A new company, *Western Wolfram N. L.*, has been formed in Adelaide to take up wolframite claims in the Pilbara district. The world shortage of sulphur has prompted the Department of Mines by drilling for pyrite in the Yilgarn goldfield. Upon completion of this program, the Ravensthorpe area will also be prospected for pyrite. At Coobine, 250 miles north of Meekatharra, drilling is being undertaken by the Bureau of Mineral Resources for chromite, while investigations of copper and scheelite deposits at Earlstown about 200 miles northeast of Kalgoorlie, are proceeding.

TASMANIA—In the northeast part of the state, tin mining has taken a new lease on life. At Weldborough, old mines are being re-opened and at Derby, the Briseis mine is being developed with the production goal set for 260 long tons of concentrate per annum.

NEW SOUTH WALES—Available results of deep drill holes at the Great Cobar mines, operated by *New Occidental Gold Mines N.L.*, have confirmed the continuation of the ore body at depth. Two holes have intersected the lodes at a depth of 2,500 feet, 1,000 feet below the lowest level. The mineralized formation intersected has an overall horizontal width of 460 feet and consists of five distinct lodes separated by mineralized slates of low grade. A third hole is to be drilled to 3,400 feet and one on the *Chesney* mine to 2,500 feet. Other holes are to be drilled to about 1,200 feet on the *Gladstone* and *Dapville* ore bodies to the south of the Great Cobar.

WESTERN AUSTRALIA—*Great Western Consolidated N.L.* intends to sink the main shaft of the *Copperhead* mine to 11,000 feet before beginning production. Open cut operations will provide the first year's mill feed, some 790,000 long tons of ore being readily available. In the northern series of the mine, scheelite has been found during development operations. It is not known whether this occurrence will prove economic.

NORTHERN TERRITORY—The present high price of wolframite—£A26/5/-per unit (fob Sydney)—together with rearmament programs has resulted in a mining boom, particularly in this territory. This has aggravated the normal shortage of labor in this undeveloped region and has seriously affected the operations of gold and mica mines throughout the Territory. Numerous gold mining companies have taken up wolframite and tin leases, several new deposits have been discovered, and various old working rehabilitated. Pine Creek, Hatches Creek, Mosquito Creek, Mount Masson, and Wauchope are all active centers. A mill is to be erected at Mosquito Creek and three mining companies are reported working in the field.



NORTH AMERICA

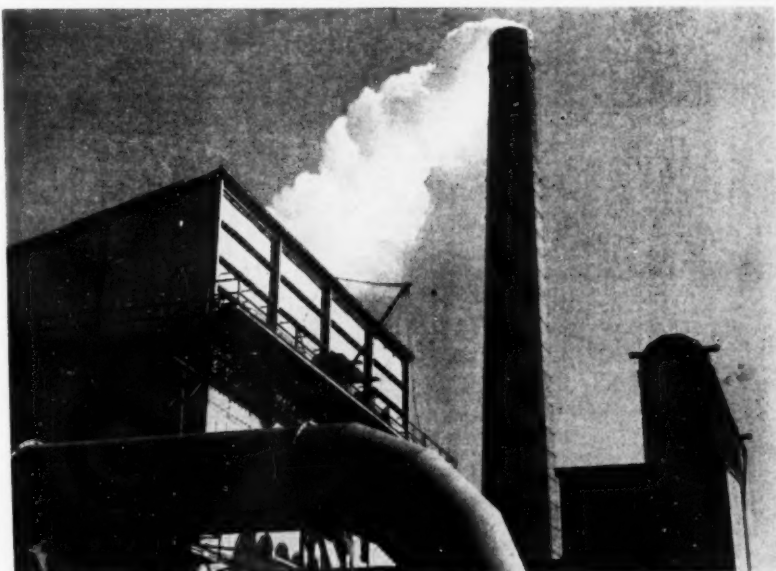
ALASKA—The *Brinker-Johnson Company* has paid off a \$300,000 debt to the United States Reconstruction Finance

Corporation with gold dredged from its Caribou Creek property. This season the dredge has been worked well up toward the head of the stream. Prospecting of a new section three miles away has begun.

ONTARIO—*McIntyre Porcupine Mines Ltd.* reports discovery of a high-grade ore body on the 5,900-foot level of its gold mine in the Porcupine district of Northern Ontario. Most ore has been coming from the 3,800-foot level. The lower body is said to be superior to the upper in both grade and width, and geologists are said to believe that the newer discovery may go deeper than in any other Canadian mine.

YUKON TERRITORY—*Yukore Mines Limited* has acquired the *Idaho Bill* lead-silver-zinc property near Whitehorse, Yukon Territory. Some development work had already been carried on there, and additional mining equipment is being moved into the area. Investigation by the company's consulting engineer, Harvey Singer, revealed a 135-foot adit intersecting some of the veins already driven into the side of the hill some 1,500 feet above the valley floor. He says that no shaft will be required to mine the ore in the Idaho Bill because levels may be opened up by merely tunneling into the mountainside and operating on a gravity basis. The company also holds eight claims in the Galena Hill area, Mayo district, Yukon; a uranium prospect in the Hottah Lake area, Northwest Territories; and twelve gold claims in the McKay Lake area, Northwest Territories.

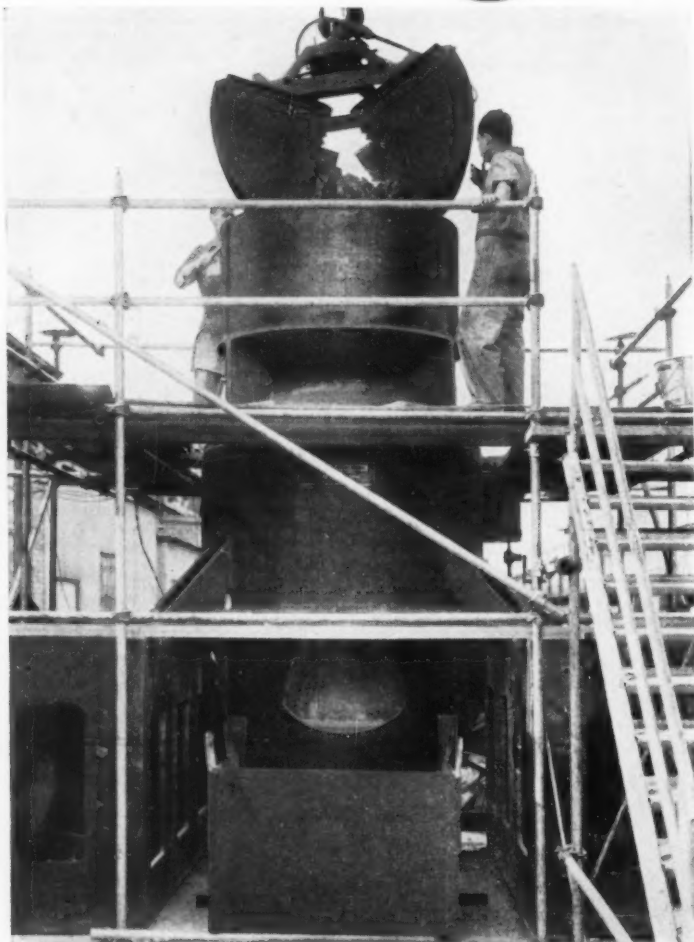
BRITISH COLUMBIA—The *Velvet* mill at Rossland has been dismantled and



BLAST FURNACE FUMES TO BE FILTERED

An intensive-type baghouse has been installed by the *Electrolytic Refining and Smelting Company of Australia Pty. Limited* to trap fumes from its blast furnace and converter. The company operates in a heavily populated area of Port Kembla, New South Wales, 50 miles south of Sydney. Shown rising from the stack are the smelter gases which are to be filtered; the baghouse (left) where this operation will take place; the instrument room atop the humidification chamber (right); and, behind them all, the atmospheric coolers. Plant expenses will be repaid by increased metals recovery.

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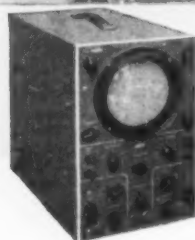
All weight in the *Hydrocone* crusher is concentrated into resisting the crushing force. Top and bottom shell, eccentric and spider cap are of cast steel construction. The short, heavy main-shaft is annealed forged steel. Mantle and concaves are of a special steel.

Hydraulic *Speed-Set* control enables the operator to change product size quickly and easily. Automatic Reset provides hydraulic protection from tramp iron.

More facts about the *Hydrocone* crusher can be obtained from the A-C representative in your area, or by writing for *Hydrocone* crusher Bulletin 07B7145B. Allis-Chalmers, Milwaukee 1, Wis.

A-3487

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Oscillograph readings of strain on *Hydrocone* crusher were made at various points on the topshell spider, topshell, bottomshell and bottom plate. Test was made in A-C Processing Machinery laboratory by Allis-Chalmers engineers.

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moved to the Argenta property of *Hamil Silver-Lead Mines Ltd.* The mill will be located on a 27-acre site 3½ miles from the mine, and may be reached by a road built last year at a cost of \$13,000. The mill has a capacity of 150 tons and should be in operation by the end of March 1952.

MINNESOTA—The *Oliver Iron Mining Company* set off a record blast on October 20 when a rock island in the east end of the Hull-Rust pit was blasted to remove the rock and to recover the layer of ore underneath. Almost 120 tons of explosives were used and there were 108 drill holes representing a total depth of about two miles. Electric delay caps were used to set off the blast with the result that very little shock was felt. In all, 287,000 cubic yards of hard rock was broken at a cost of \$38,423.25 for explosives.

ONTARIO—Construction has started on *Canadian Industries Limited's* new liquid sulphur dioxide plant at Copper Cliff, Ontario. The new unit will produce more than 90,000 tons of liquid sulphur dioxide yearly from smelter gases given off from the *International Nickel Company of Canada, Limited's* plant at Copper Cliff. This will be *Canadian Industries' second* plant, the first now being expanded to increase H_2SO_4 production by 60 percent.

QUEBEC—Four new levels have been opened by shaft deepening at the Duparquet township property of *Consolidated Duquesne Mining Company*. Drifting has started on two of the levels—the 875-foot and the 1,000 foot. A downward extension of the most easterly oreshoot may have been entered at the 875-foot level. Driving of the 1,000-foot level has proceeded 180 feet from the shaft station with at least another 600 feet to go before reaching the downward extension of the ore.

YUKON TERRITORY—A silver-lead vein at least six feet wide has been disclosed by tunneling on the *Tundra* property of *Mayo Mines Limited* in the Keno Hill area, Yukon. The vein, now intersected in the lower tunnel, may be an extension of one recently discovered on the adjoining *Bellekeno* Mines property. Development is going ahead on a two-shift basis.

NOVA SCOTIA—An intersection of 140 feet has been cut by diamond drill hole no. 38 at the base metal property of *Minda-Scotia Mines Limited*. True width is said to be 40 feet. Indicated tonnage of the deposit over a length of 500 feet in the western section is now 550,000 tons, containing 2.7 percent lead and 3.5 percent zinc. Shallow drilling in the eastern section shows low values in lead and zinc, and high values in sulphur.

QUEBEC—*Beaupas Mines Limited* has been formed to develop a base metal prospect in Duvernay township northwest of Barraute. J. K. Smith is president and M. Murphy is vice president.

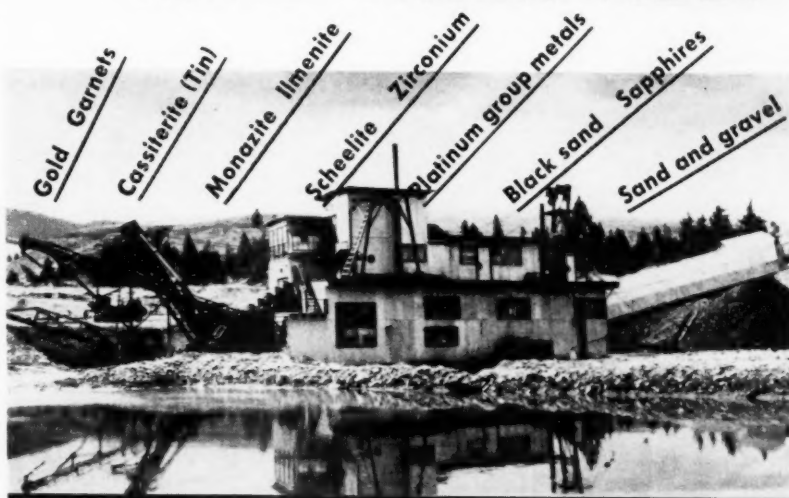
BRITISH COLUMBIA—To refinance *Wellington Mines, Inc.*, a new company has been formed, *New Wellington Mines, Ltd.*, with an authorized capital of \$1,500,000. The old company has transferred its mine at Retallack, B.C., and other assets to the new firm, in return for 750,000 shares of stock. *New Wellington* will assume liabilities of *Wellington*. The mine, which has been idle since 1946, will be reopened.

ONTARIO—*San Antonio Gold Mines Limited* has obtained an option on the *Neepawa Island* property near Sioux

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INTERNATIONAL

Lookout, Ontario, formerly held by *Central Manitoba Mines*. A minimum of 5,000 feet will be drilled. Under terms of the option, if a new company is formed Central Manitoba will receive a 5 percent interest in return for money already expended on the property.

QUEBEC—*East Sullivan Mines Limited* is reported to have discovered a large zinc deposit in the Gaspé area of Quebec. The company has invested \$250,000 in exploration work and will invest several millions more to develop the mine.

BRITISH COLUMBIA—The *Star* base metal property in the Ainsworth district, owned by *Privateer Mines, Ltd.*, will be taken over and developed by a newly formed associate company, *Privateer Base Metals, Ltd.* If ore development warrants

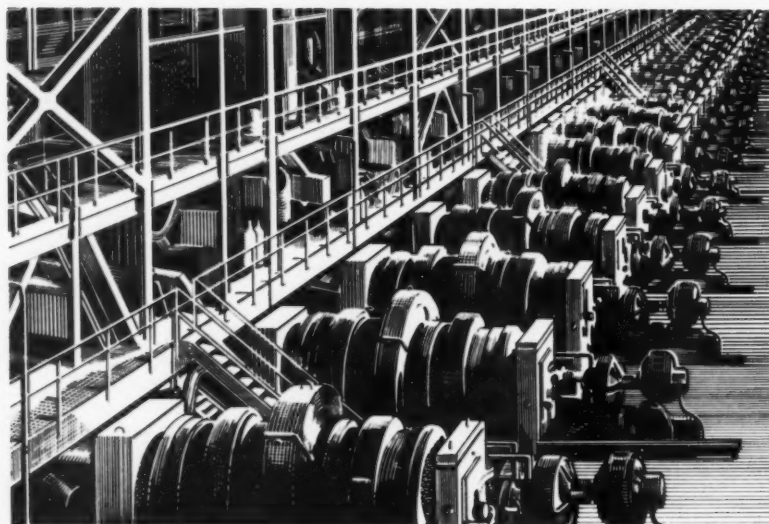
it, the Privateer mill equipment will be moved to the Star.

TENNESSEE—A \$1,000,000 chrome ferroalloy smelter will be operated in Memphis, Tennessee by *Montana Ferroalloys, Inc.*, a wholly owned subsidiary of *Chromium Mining & Smelting Corporation*, of New York, which, in turn, is a subsidiary of *Chromium Mining & Smelting Corporation Limited* of Sault Ste. Marie, Ontario. The parent Canadian company also plans to expand a finishing plant in Chicago which will handle increased production from the new Tennessee operation. The new plant location was chosen to take advantage of the water transportation system of the Mississippi River. The Chicago and Sault Ste. Marie facilities also have access to the same river transportation system.

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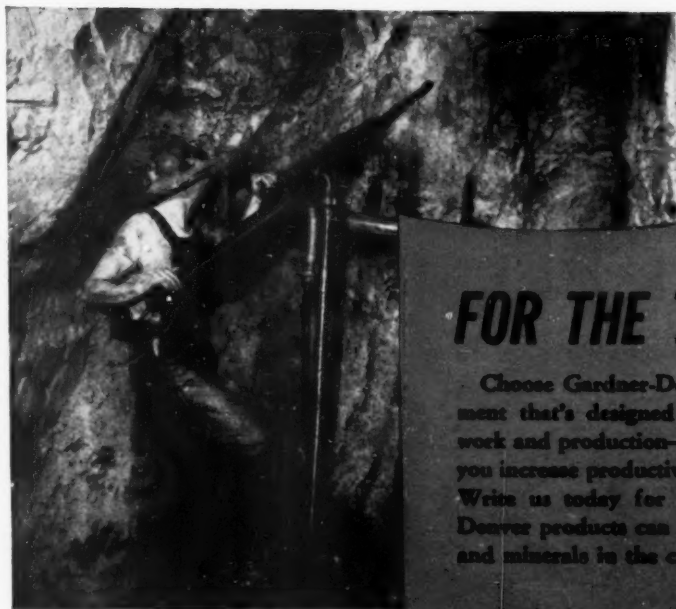
WORLD MINING is published the 26th of each month as a regular department of **MINING WORLD** and is also circulated as a separate section on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

NORTHWEST TERRITORIES—Approximately 1,600 feet were drilled before winter forced *Rankin Inlet Nickel Mines Ltd.* to abandon its drilling program. Supplies have been taken in to the property by boat so that it will be possible to resume work early next year before the breakup. Rankin Inlet Nickel Mines Ltd. was formed shortly after February 1951 when some 35 claims were staked surrounding the original group of 14 claims held under mining leases at Rankin Inlet.

BRITISH COLUMBIA—The *Noonday* mine in the Slocan mining district has been optioned to a group of Vancouver and Toronto businessmen by *Alpine Mining Company* of Spokane, Washington. Under terms of the agreement, the optionees will open up No. 4 level at a cost of \$10,000. If reports are favorable, Alpine will accept cash and a share interest. The optionees will then provide \$150,000 for development and erection of a mill.

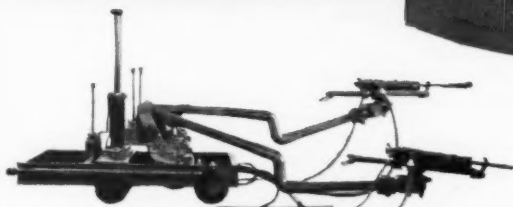
ONTARIO—*Northern Pine Lake Mines* is reported to have changed its name to *Manasseh Silver-Cobalt Mines*. It holds nine claims in Gillies Limit and Lorraine townships, south of Cobalt, Ontario. Former operators sunk a 225-foot shaft on the property but there has been no activity for many years. Future plans have not yet been announced. E. C. Thompson is president.

QUEBEC—*Gan Copper Company* has started diamond drilling on a new block of claims which adjoins its original group in Beauchester township. Six shallow holes have already been put down and the first deep hole is being drilled to explore under an anomaly indicated in a geophysical survey. *Denison Nickel*

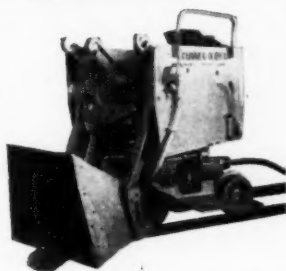


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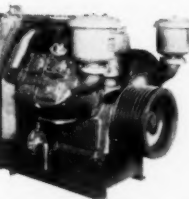
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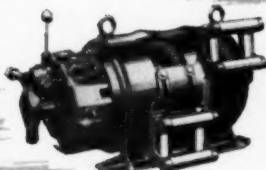


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[World Mining Section—33]

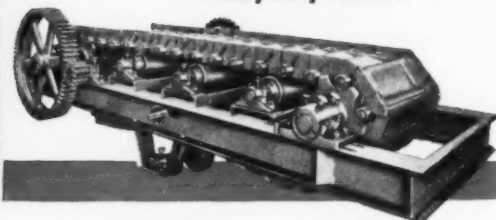
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TELSMITH

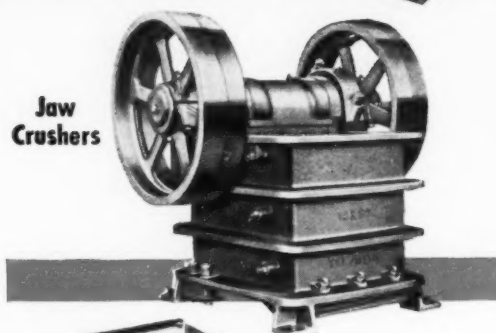
feeding
coarse crushing
screening
fine crushing

EQUIPMENT FOR MINES

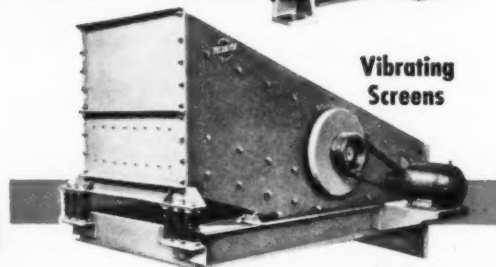
Heavy-Duty Feeders



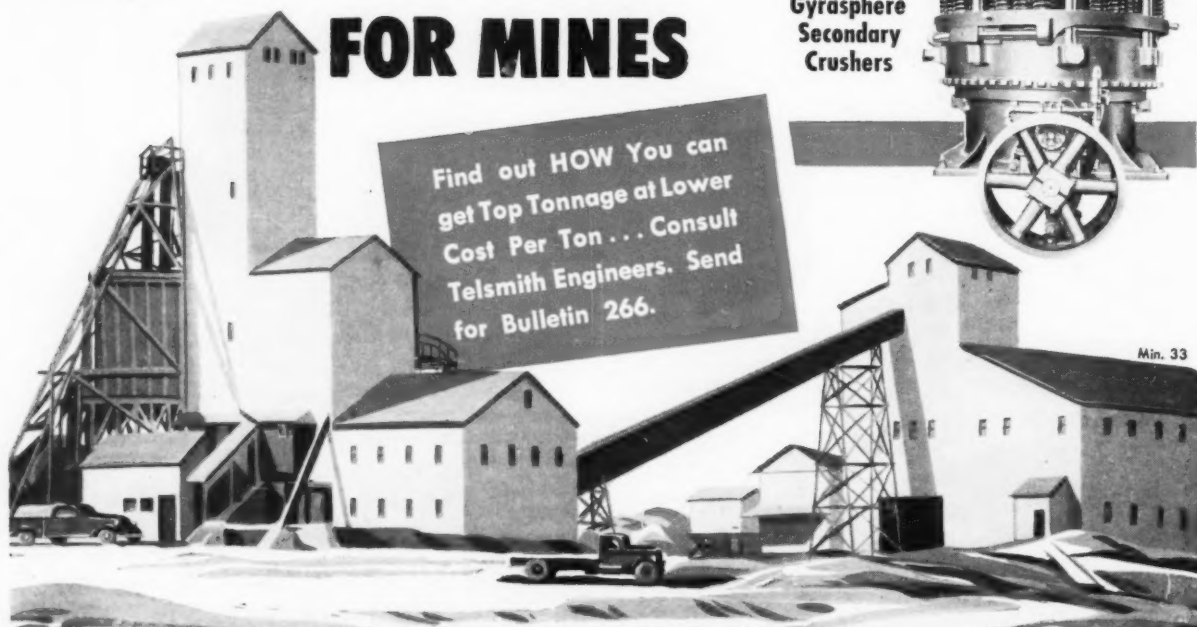
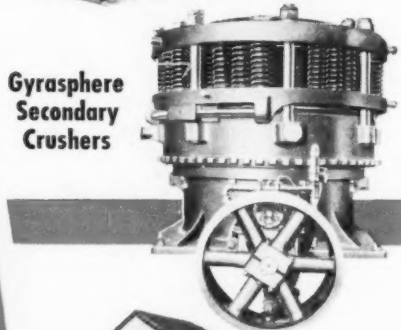
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INTERNATIONAL

Mines Ltd. owns a controlling interest in Gan.

BRITISH COLUMBIA—*Western Mines Limited* has acquired the former *Ainsworth Consolidated* property adjoining *Yale Lead and Zinc Mines Ltd.* at Ainsworth, B.C. First objective of the company is maximum production from the 100-ton mill which heretofore had only been operating at 40 percent of capacity. An extensive diamond drilling program is planned to increase ore reserves. One of the veins to be tested will be the Florence vein for lateral and vertical extensions.

ALASKA—*Zenda Gold Mining Company* has leased a tin placer mining property, 100 miles from Nome. Drilling is under way to prove and to extend the area already drilled by the *United States Bureau of Mines*. The *United States Defense Minerals Administration* has granted a loan of \$54,000 and *Zenda* is adding \$6,000 to finance the drilling. If results confirm those findings of the Bureau which showed substantial tin values, the company will move a dredge onto the property.

ONTARIO—Two large freighters are under construction for the *Canada Steamship Lines*. The newest one, whose keel has just been laid, will have a total gross deadweight tonnage of 18,750, identical to its sister ship which is said to be the longest bulk carrier on the Great Lakes.

MANITOBA—The *Sherridon* mine, operated by *Sherritt Gordon Mines Ltd.*, is said to be closing down now that its ore reserves are practically exhausted. During its life, the mine produced 180,000 short tons of copper and 150,000 tons of 50 percent zinc concentrate. Much of the equipment will be moved to new company property at Lynn Lake.

BRITISH COLUMBIA—A long crosscut on the 26th level from the Empire shaft to the Crown shaft has been driven to completion by *Bralorne Mines Limited*. This crosscut will improve ventilation on the lower levels of the mine. For the first nine months of this year, 127,185 dry tons were milled, from which 61,633 ounces of gold were recovered.

ONTARIO—Along with its newly completed concentrator, *International Nickel Company of Canada* has also completed a new shaft at its *Creighton* mine in the Sudbury district of Ontario. The new shaft, called No. 7, has been sunk to an initial depth of 2,050 feet. It brings to 13 the number of operating shafts in the company's underground mines in that district.

QUEBEC—One of the richest gold veins said to have ever been struck in the area around *Malartic* has been discovered 500 feet under the site of a church. The country is reported to have produced low-grade ore only, thus far, but the new vein is said to assay \$40 a ton. *Canadian Malartic Gold Mines* is driving a tunnel which will be 500 feet under the church.

COLORADO—Construction of 162 miles of hard-surfaced arterial highway from Whitewater to Dove Creek, Colorado has been authorized and congressional appropriation of \$1,500,000 has been made for its construction. The road will be through the heart of the *Colorado Plateau* uranium-vanadium region and will speed up ore transportation to

processing plants at Grand Junction, Uravan, Naturita and Rifle, Colorado. An additional \$800,000 has been appropriated for the construction of roads from mines to the arterial highway. Blair Burwell, president of the *Colorado Mining Association*, carried the fight to Washington to secure the appropriation.

MINNESOTA—Contracts have been let by *Reserve Mining Company* to construct a 2,500,000-ton-per-year beneficiating plant which will produce high-grade iron pellets from magnetic taconite. The new plant will be located 55 miles northeast of Duluth, and should be completed in 1955.

INDIANA—Construction has started on *Standard Oil of Indiana's* new sulphur plant in Whiting, Indiana. The plant will extract hydrogen sulfide from by-product fuel gases and convert it into sulphur. Completion is expected about the middle of 1952.



EUROPE

IRIE—The *United States Economic Cooperation Administration* has approved a development loan of £37,000 to *Silvermines Lead and Zinc Company*, the Irish base metal producer. The new 200-foot shaft in the Silvermines zinc area was 65-feet deep by October 10, and was to be completed by the end of November. The company incurred a loss of £31,238

during the year to March 31, 1951. Its debit balance now stands at £51,980. It is estimated that a profit of £13,149 was earned in the five months to August 1951.

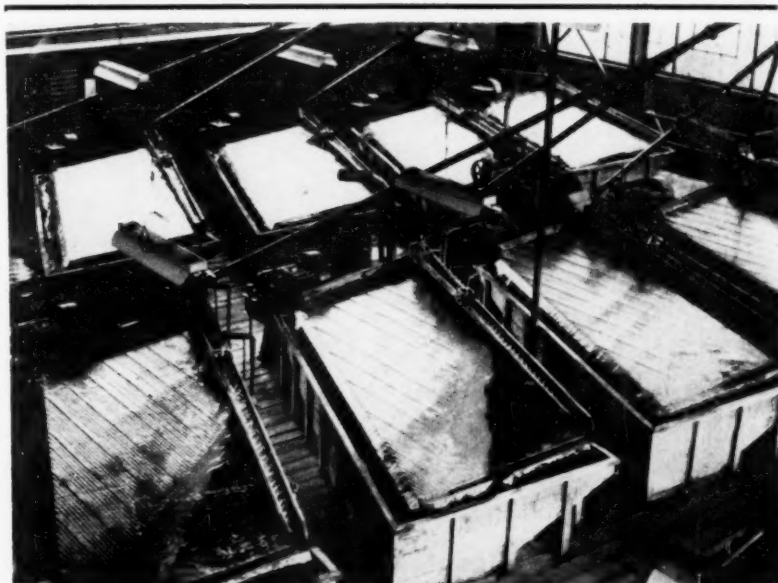
ITALY—The *IMI* has granted a new loan of \$683,000 to the *Cornigliano* steel works bringing the total to \$7,683,000. The funds will be used to pay for construction of the huge rolling mill to be built there. The government may guarantee the bonds to be issued by the *FINSIDER* for the lire financing of the plant.

WEST GERMANY—The *West German Government Import Committee* is reported to have authorized the import of \$2,000,000 worth of wolframite ore.

YUGOSLAVIA—Complete electrical equipment for two iron ore sintering plants has been ordered by the Yugoslavian government from *Westinghouse Electric International Company*. The capacity of the country's two largest steel mills at Sisak, in Croatia, and at Zenica, in Bosnia, should be increased by 25 percent, or an additional 75,000 tons of steel per year. Current annual production is believed to be between 400,000 and 500,000 tons.

POLAND—The large new blast furnace at the *Kosciusko Works* at Chorzow is reported to be capable of producing 250,000 tons of pig iron annually.

YUGOSLAVIA—Magnetite deposits extending from the middle stretches of the River Drina to Kosovska Mitrovica in the south and Gornji Milanovac in the east, are said to have been discovered. Reserves are put at 7,000,000 tons. A magnetite sintering plant is reportedly



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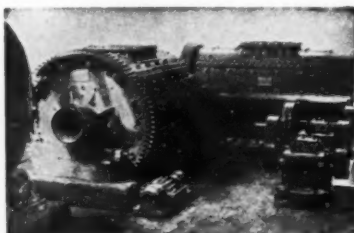
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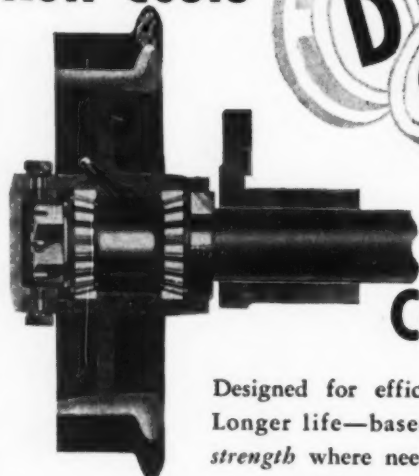
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already under construction in the area.

ITALY—During the first half of 1951, the following tonnage was produced: aluminum, 22,330; quicksilver, 891; lead, 19,778; zinc, 22,893. For the same period in 1950 the figures were: aluminum 16,540; quicksilver, 876; lead, 17,878; and zinc 17,402.

UNITED KINGDOM—The Royal School of Mines, or as it is officially called, the School of Mines and Science Applied to the Arts, celebrated its centennial in October. Founded originally at the suggestion of Prince Albert, consort of Queen Victoria, in 1851, the school started as an appendage to the geological museum, but has progressed as the industry it serves expanded rapidly in the latter part of the 19th century.

CZECHOSLOVAKIA—The original goal for the third year (1953) of the Five-Year Plan is reported to have been increased. The Plan's initial estimate for 1953 production was 1,400,000 tons of iron ore 2,700,000 tons of pig iron 3,500,000 tons of raw steel, and 2,500,000 tons of rolled steel. Feverish activity is now under way in the regions of Bohemian-Moravian Heights Ostrava-Vitkovice, and Eastern Slovakia to have blast furnaces and heavy plant facilities in production ahead of schedule. In the Bohemian-Moravian region, the first heavy industry is being introduced—a combine for the production of machinery. The first electric steel furnace has already been tapped. The Ostrava-Vitkovice Works is under construction, along with the rebuilding and expansion of the town of Ostrava. The first modern blast furnace has been built and other stacks are under construction. In Eastern Slovakia, an iron and steel combine is supposed to be organizing to develop known but unworked ore deposits.

ITALY—Aluminum output over the past year has increased from 33,000 tons, to about 45,000 tons. The Interministerial Price Committee reviewed the condition of the industry since 1950 when an increase in the price of aluminum from 340 to 365 lira per Kg had been authorized. The present situation was termed satisfactory and no further price increase was considered.

FRANCE—To alleviate the world copper shortage, 18 member nations of the Organization for European Economic Co-operation agreed to prohibit the use of copper and copper alloys above 40 percent by weight in the manufacture of more than 200 different items. They also agreed not to export to each other items containing copper in prohibited quantities.

BRITISH ISLES—The Van Lead mining property near Llandiloes, Montgomeryshire, has changed hands and it is reported that it may be reopened. Considerable tin reserves are thought to be on hand, although the lead prospects are not good.

YUGOSLAVIA—Six new open hearth furnaces have been added to the smelter at Zvecan, making a total of 12. A new water jacket furnace has been built and a new sinter plant is in operation. The plant expects to reach an output of 55,000 metric tons of lead plus 50 tons of bismuth this year. The ore-dressing plant has been enlarged by 1,000 tons daily capacity. An annual rate of 77,000 metric tons of lead is expected in a few years. At the nearby Stari-Trg mine at Trepca, a new shaft is being sunk and considerable development work is taking place. Ore reserves are estimated at 10,000,000 tons.

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INTERNATIONAL

GERMANY—The *August-Thyssen-Hütte*, formerly the largest steel mill in Europe, has applied to the *Military Security Board* and the *Allied Steel Control Group* for permission to operate at an annual steel ingot capacity of 1,000,000 metric tons. The plant has permission now to make 600,000 tons of pig iron and 117,000 tons of Siemens-Martin steel a year. They say this is not enough to keep the company in business. An application has also been made for a loan to help develop the intended new capacity.

SCOTLAND—A private company is reported to be interested in the reopening of lead mines at Leadhills on the Lanarkshire Dumfriesshire border. Silver is reported to have been found in the Sunart area of Argyllshire.

SICILY—Copper ores have been discovered in the area of Monti Peloritani. Pending results of the analysis of the Italian Ministry for Industry's mining department, nothing can be said of its importance.

ITALY—The *Societa Anglo-Italiana Zolfi* has been organized in Palermo with a capital of 1,000,000 lire. It has applied to the Sicilian Regional Government for research permits to explore the sulphur resources in the area of Agrigento and Caltanissetta. An Italian state organization, the *Ente zolfi Italiani*, is already at work in this area, with a permit covering the whole territory between Palma Montechiaro-Agrigento-Aragona and between Caltanissetta-San Cataldo-Enna-Pietraperzia. The Anglo-Italiana Zolfi will import mining machinery and equipment from Great Britain, and, on the basis of its concession, will be entitled to export to the United Kingdom and the British Commonwealth 50 percent of its output.

FRANCE—A Wemco Mobil-Mill, Model 2M, recently ordered by *Societe Fermiere des Mines du Blaymard* at Lozere, will handle 20 metric tons per hour of lead-zinc ore sized at 1 inch by 10 mesh. This latter unit will be equipped with a 6 by 5 foot drum-type separator. Using a separation gravity 2.90, it is expected to produce about 25 percent sink material.

YUGOSLAVIA—A chrome ore structure has been discovered by government mining officials in central Serbia between Kumanovo and Skoplje. According to preliminary estimates, 100,000 tons of chrome ore could be obtained yearly for a period of 10 years from the deposit.



LATIN AMERICA

MEXICO—*Cia. Fundidora de Fierro y Acero de Monterrey, S.A.* Monterrey, Nuevo Leon, Mexico's largest iron and steel works, is to spend 40,000,000 to 50,000,000 pesos (\$4,620,000 to \$5,780,000) for mill and other installations in order to increase its annual steel production to 250,000 tons. Fundidora's board recently voted to raise the company's capital to 50,000,000 pesos by the sale of surplus lands and subscriptions by stockholders.

BOLIVIA—*Patino Mines & Enterprises Consolidated (Inc.)* reports that for the first six months of 1951, its estimated income was 139,000,000 bolivianos (approximately \$2,300,000) and a loss of \$1,500,000 before providing for taxes. After taxes, estimated net profit amounted to 120,000,000 bolivianos (approximately \$2,000,000) and a loss of \$1,600,000. In these estimates, Bolivian currency is approximated to the Bolivian Government's official rate of 60 bolivianos to \$1.00. For the same period in 1950 profits after taxes amounted to 76,000,000 bolivianos (approximately \$1,270,000) plus \$567,000.

VENEZUELA—*Orinoco Mining Corporation*, the U. S. Steel subsidiary which is developing the latter's iron ore properties in Venezuela, has awarded a \$2,000,000 cost-plus contract to *Smith Construction Company de Venezuela, C.A.* to set up Diesel-electric generating facilities at Cerro Bolivar.

BRAZIL—The *Rio Doce Valley Company*, in charge of mining and exporting Itabira iron ore, shipped 811,655 metric tons of ore abroad during the first eight months of this year, more than all that was shipped during 1950. It is expected that iron ore exports during 1951 will total 1,200,000 tons, while the schedule for next year will bring exports to 1,500,000 tons. The United States is receiving 80 percent of the ore and smaller shipments are going to Canada, The Netherlands, England, Germany, and Belgium. The company has planned to increase its capital investment by 50 percent which is expected to bring a 100 percent rise in

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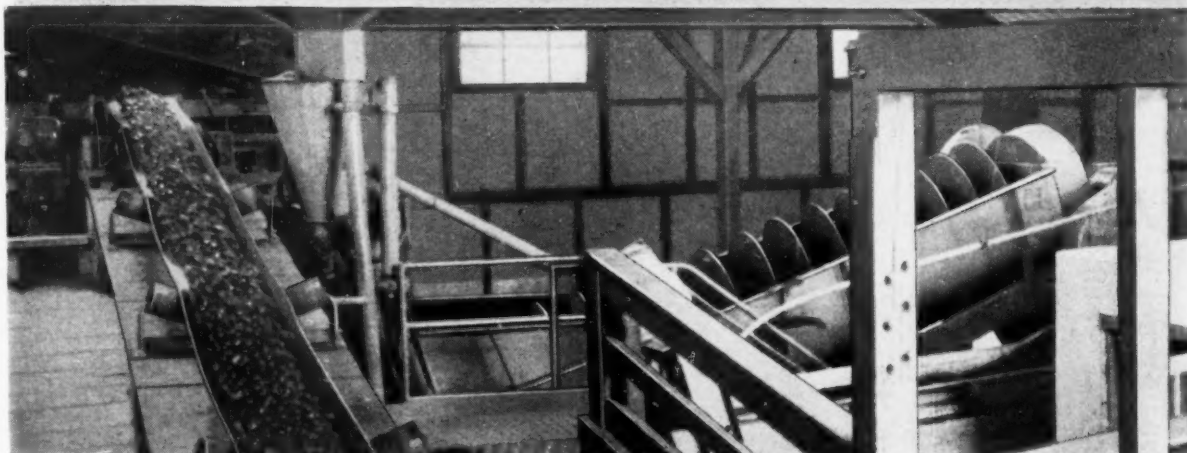
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R.O.M. Coal (Bituminous) 7" top size	Feed Float Coal Middling Refuse	10.28% ash 6.08% ash 25.44% ash 70.57% ash	salable product	Crystal Block Coal & Coke Co.	1951
Coal (Jig Middling) (Bituminous) 1½" top size	Feed Float Coal Middling Refuse	62.3% ash 27.5% ash 40.7% ash 78.0% ash	diverted to refuse	U. S. Coal & Coke Co.	1949
Garnet 1" top size	Feed Tailing Middling Concentrate	no sample 2.8% garnet 32.9% garnet 91.5% garnet	recrushed & recycled to HMS	Barton Mines Co.	1948
Zinc ore 1½" top size	Feed Tailing Middling Concentrate	2.00% zinc 0.63% zinc 9.28% zinc 36.00% zinc	recrushed for flotation feed	Eagle Picher Mining & Smelting Co.	1946
Iron Ore (Mesabi) 1" top size	Feed Tailing Middling Concentrate	44.57% Fe 12.39% Fe 36.52% Fe 57.76% Fe	diverted to tailing	M. A. Hanna Co.	1951
Iron Ore (Alabama Red Ore) 4" top size	Feed Tailing Middling Concentrate	57.76% Fe operations just started, no data available	stockpiled for future treatment	Gloss-Sheffield Steel & Iron Co.	1951

JUST ONE MEDIUM CIRCUIT . . . LOWER INITIAL COST, SIMPLIFIED OPERATION

These examples of *actual* HMS separations illustrate the flexibility of the Akins separatory vessel and the economies that are possible when middling particles are rejected from sink and float constituents of a crude feed.

The Akins requires just one medium circuit to make the middling separation. Result: lower initial plant cost; simplified operation, with only one point of gravity control.

Our engineers will welcome the opportunity of discussing Akins HMS as related to your particular problems . . . either in improving existing operations or designing a completely new HMS plant. Write or call, now.

The Akins is the only vessel now available with a background of proved performance. Write for Bulletin No. 49



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Licensed Manufacturer—Head, Wrightson & Co., Ltd.,
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Manufacturer—Head, Wrightson & Co., S. A., (Pty.)
Ltd., Johannesburg, Licensed Manufacturer—Edw. J.
Neill Co., Manila, P. I., Sales Agents—Wright Bros.,
Credit Foncier Bldg., Vancouver, British Columbia,
Sales Agents.



Miners' safety and uninterrupted lead-zinc production are being assured at Combined Metals Reduction Company's Caselton mine, Pioche, Nevada, through use of Tiger Brand shaft-hoisting rope. Tailored for the job, this rope is constructed to best meet all conditions of loading, winding, corrosion, vibration.

Tiger Brand rope fights vibration, assures maximum fatigue life!

On any equipment...for any job you handle...rely on tough American Tiger Brand, the wire rope that's rigidly controlled by United States Steel from raw ore to finished product. To get all the stamina engineered into it, you're welcome to the services of a Field Specialist. For free consultation, contact your Tiger Brand distributor or write Columbia Steel Company, Room 1422, Russ Bldg., San Francisco 4.



U-S-S TIGER BRAND Wire Rope

UNITED STATES STEEL

INTERNATIONAL

ore exports. New mining equipment, considerable railway material, and some dock improvements have already been installed to help speed up shipments. When completed, these installations will make exports of 3,000,000 tons feasible but the company states that when plans now made are put into effect, including construction of a new railway, exports up to 10,000,000 tons yearly will become possible.

BRAZIL—Brazilian economists estimate that at the present rate of exploitation, manganese deposits in the state of Minas Gerais may be exhausted within a decade or so. Their recent survey shows that known reserves in the state are now not much more than 5,000,000 tons, which are being consumed at a rate above 240,000 tons yearly. Increased demand at home and abroad accounts for the rise in consumption. Domestic consumption, for example, has been tripling in annual averages about every five years. Main seriousness of the situation lies in the fact that Minas Gerais manganese is much more accessible because of the transportation networks built around it. Brazil has plenty of manganese in other areas, including Mato Grosso, site of the famed Urucum deposits, and Amapa, where some 20,000,000 tons may await exploitation, but transportation facilities in these areas are still to be developed.

MEXICO—Saudi Arabia has contracted with Mexico for another silver purchase and for silver coin minting, this one worth 65,000,000 pesos (\$7,510,000). The contract was signed in Washington by the Mexican and Arabian ambassadors to the United States. This brings to nearly 200,000,000 pesos (\$23,120,000) the amount of silver that Mexico has sold to Saudi Arabia for minting during the past year.

BRAZIL—The National Mineral Production Department recently announced discovery of a magnetite-bearing bed at Serrote de Lage, in the state of Alagoas. Pure magnetite in the bed is estimated to be about 20,000 tons.

COLOMBIA—Production figures for the nine months ended September 30, 1951, for the three Placer Development, Ltd. (of Canada) subsidiaries, *Nechi Consolidated Dredging Ltd.*, *Asnazu Gold Dredging Ltd.*, and *Pato Consolidated Gold Dredging Ltd.* are as follows: *Nechi*—3,241,000 cubic yards dredged for a recovery of 15,874 ounces of fine gold; *Asnazu*—4,387,000 cubic yards dredged for a recovery of 14,243 ounces of fine gold; and *Pato*—14,209,600 cubic yards dredged for a recovery of 134,990 ounces.

MEXICO—Recently organized and registered are the following mining enterprises: *Cia. Minera Oriental, S.A.* by Agustin B. Carrasco and Juan Joitar Carlos; *General Ores Company, S.A.* by Alfred Goldberg and Arthur Beasoches; *Cia. Minera Actopan, S.A.* by Paul Northey and Lorenzo Schroller; *Manganeso y Metales de Mexico, S.A.* by Jesus Monreal and Jesus Urquiza; *Cia. Minera del Mezquital, S.A.* by Enrique Martinez and Cepeda Villarreal; *Minerales de Zacatecas, S.A.* by Carlos Canales and Fernando Villalpando; *Minera Continental, S.A.* by Hector Ponce and Santiago Piña Soria; *Minera San Rafael, S.A.* Carlos Canales and Horacia de la Parra; and *Cia. Minera El Rincon del Pedregal*

by Anexas, S.A. by Alfonso Jimenez and Manuel del Castillo.



AFRICA

FRENCH MOROCCO—*Societe Des Mines de Zellidja*, an affiliate of *Newmont Mining Corporation* in New York, expects to deliver 2,500 tons of lead and zinc to the United States munitions stockpile as first payment on an *Economic Cooperation Administration* loan of \$7,600,000.

SOUTH AFRICA—The first gold bar to be produced from the new goldfields of the Orange Free State was poured at the *St. Helena* gold mine on October 25. A suggestion that it should be made into cuff links and these distributed free to stockholders was not received with favor by the company who said that the historic bar will probably be donated to a museum.

SOUTHERN RHODESIA—A new cyanide plant has been placed in operation by *Turk Mines Ltd.* It was built at a cost of £225,000. Previous tonnage handled monthly by the mine amounted to only 3,000 to 4,000 tons. This figure is expected to be trebled by the opening of the new plant.

NIGERIA—The *Ex-Lands Nigeria Limited*, a United Kingdom company, is reported to have produced 263 tons of tin concentrates in the first five months of 1951. In 1950, the company produced 712 tons of tin concentrates containing about 74 percent tin. This is slightly under the 1949 output of 725 tons of con-

centrates containing 537 tons of tin. Prospecting work in 1950 brought reserves up to 4,658 tons. This was an increase of 76 tons over the 1949 figure.

SOUTH AFRICA—The Union's second iron mine, to be located at Sishen northwest of Kimberley, is expected to be in operation within 18 months. Daily output is expected to be 1,500 tons, with reserves of 150,000,000 tons. The new mine will be an open pit. The *Thabazimbi* iron mine is currently producing between 26,000 and 30,000 tons a week with hopes of raising this figure to 37,000 tons shortly. The new mine will take some of the delivery responsibility off the *Thabazimbi* which now supplies the *South African Iron and Steel Industrial Corporation (Iscon)* plants at Pretoria and Vanderbijl Park. The Vanderbijl Park works when completed will consist of 54 coke ovens, two blast furnaces (arranged for future extension to four), five open hearth furnaces, and rolling mill plant. Tin plate production there, the first in the Union, started a few months ago. Dr. F. Meyer, chairman of Iscon, expects the combined steel output of the two plants to be from 1,200,000 tons to 1,300,000 tons a year when extensions are completed. He reports that in 1950 total consumption of finished steel in the Union was about 1,086,000 tons. Total production by the end of this year is anticipated to reach 1,050,000 tons, a figure very close to total consumption of last year including 444,000 tons which were imported.

SOUTHERN RHODESIA—The *United States Economic Cooperation Administration* is reported to have agreed to finance the operations of asbestos mines in Southern Rhodesia. The agreement is said to cover the period to the end of 1953 and includes the *Selected Mines and Marketing (Rhodesia)*



NATIVES SORT AFRICAN MAGNESITE

Althorpe Magnesite Ltd., Malelane, Transvaal, Union of South Africa, operates an openpit mine 40 miles northeast of Barberton, Transvaal, producing magnesite for domestic consumption. The mine was opened 45 years ago when mining was done by hand labor and ore transported by oxen. In the past two years the mine has been completely mechanized, including installation of loading and crushing equipment and an aerial tram. These facilities are all powered by a Caterpillar D311 Diesel-electric set. Production is about 500 tons monthly and nearly 100 natives are employed. In the picture the natives are sorting the white ore from waste rock.

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Ltd., the Asbestos Mining Group (Rhodesia) Ltd., Associated Asbestos Mines Ltd., and Shambra Asbestos Ltd., in the Shabani, Belingwe, and Shangani districts.

NIGERIA—In reviewing the record of the *Naraguta Tin Mines* for 1950, Herbert T. Skipp, the chairman, reported that 233.75 tons of tin and 39.50 tons

THE MARKET PLACE

GOOD USED SURPLUS EQUIPMENT

BALL MILL—10' x 36" Hardinge dry grinding type. Complete with synchronous motor and all auxiliary equipment.

KILN—Allis-Chalmers, Nodulizing type 8½' x 10' x 8½' x 50' with variable speed drive.

POWER PLANT—3—500 HP B & W Sterling type Boilers, complete aux. equip. Also 2 Waste Heat Boilers same type. 1250 KVA 440 V. Generator direct connected G.E. Steam Turbine, switch board and aux. equip. Also steam driven C.P. Air Compressor size 12" x 14" x 11".

EVAPORATING & CRYSTALLIZING PLANT—7 Swenson Calandria type Evaporators and one Vacuum Crystallizer, two stage. Complete plant with pumps, etc., on steel structure.

ELECTRIC PRECIPITATORS—1 High Duty Electrode Verticle flow type. 2 two-stage pocket electrode type.

THICKENERS—1—250' dia. and 1—160' dia. Dorr Acid-Proof Thickener mechanisms, traction type. Complete with diaphragm pump and aux. equip.

Equipment at this plant in excellent condition—operated comparatively short time.

Inspection invited

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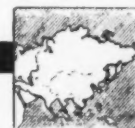
of columbite were produced. Tin recovery had been lower because of smaller production from the Korot area where certain sections of the ground worked gave disappointingly low recovery. In estimating reserves, the chairman cited the Korot incident. The expectation of higher recovery than had actually been obtained evidenced abnormal irregularities in the distribution of the tin. The tin reserves estimate of 1,277 tons must, therefore, be understood as subject to contingent revision in the light of further investigation.

NORTHERN RHODESIA—The *Mufulira* and *Roan Antelope* copper mines displayed amazing profits for the last financial year. Mufulira's gross profit of over £8,000,000 is practically double that of the previous year, while Roan Antelope at over £6,000,000 represents an improvement of over 250 percent. Costs have risen by £15 at Mufulira and £8 at the Roan, giving £70 and £81, respectively. The latest market price for their copper is £234 ton. With the opening of the refinery at Mufulira, further increases can be expected. Work on surface installations and shaft-sinking preparations have already been started at the new *Chibuluma* mine. All are controlled by *Selection Trust Ltd.*

AFRICA—World tin production in the first six months of 1951 was 83,000 long tons, an annual rate slightly higher than in 1950. World tin metal consumption in the same period was at a lower rate than that obtained in 1950. Congo production during this period was 6,007 long tons; Nigerian production 4,161 tons or some five percent of the total, a rate slightly lower than that of in 1950 and other post-war years; and French Cameroons production was estimated at 60 tons in that period.

SOUTHERN RHODESIA—A new company, *Rhodesia Monteleo Asbestos Limited*, has been formed by *New Monteleo Limited* in conjunction with *African & European Investment Ltd.* to operate a large group of asbestos claims acquired by New Monteleo near Shabani. The property has been thoroughly prospected, and exploratory work so far has proven the fiber-bearing zone to extend over strike length of 3,000 feet, with an average width of about 160 feet. Preliminary work in opening and equipping the property has begun and plans have been made to install a milling plant embodying two *Aerofall* units now on order from Canada. A milling capacity of 15,000 tons per month is proposed with future expansion to 22,500 tons. Production should begin in the second half of 1952.

BELGIAN CONGO—GEOMINES (*Cie Geologique et Miniere des Ingenieurs et des Industriels Belges*) is operating its new cassiterite recovery plant at Manono. Cassiterite bearing pegmatite for the plant is open-pit mined from the "hard rock section". Initial plant operation has been successful with a high cassiterite percentage recovery.



ASIA

TURKEY—A promising deposit of scheelite has been discovered at

FOR SALE

GOLD MINE

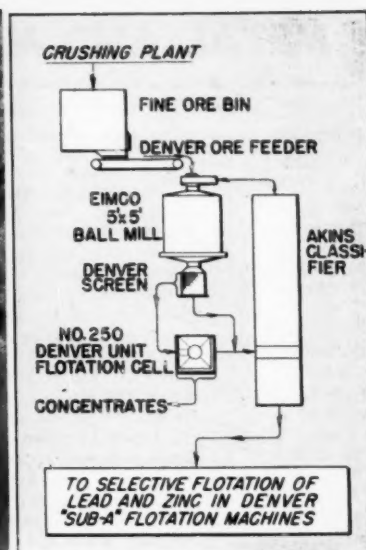
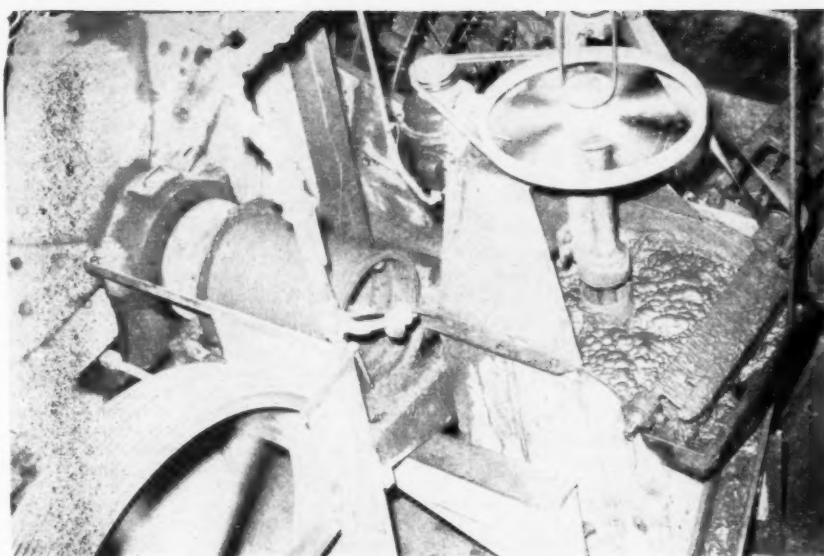
Complete 100 ton cyanide leaching plant at mine.
Buildings include bunkhouse, residences, and complete assay office.
75 KW power plant, plenty of ore blocked

CENTRAL NEVADA

out.
Plant will pay from beginning.
Owner would like to retain 1/3 interest, but will not be able to assist in operation because of health.

Complete details upon inquiry

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How Silver Standard Mines Ltd.* Recovers 65% of Lead As Soon as Free... Using Denver "Sub-A" Unit Flotation Cell

HERE ARE THE FACTS

65% of total lead concentrate shipped is recovered in a No. 250 Denver "Sub-A" Unit Flotation Cell.

Unit Cell concentrate contains 55% of the silver and 68% of the lead recovered in the combined lead concentrates. In general, Unit Cell concentrate is considerably coarser and more easily filtered than that produced by lead cleaner cells.

FEED DENSITY RANGES FROM 55% TO 65% SOLIDS.

SCREEN ANALYSIS OF UNIT CELL FEED

		by weight
+48 mesh	35.5%	
+65 mesh	15.7%	" "
+100 mesh	13.9%	" "
+200 mesh	14.7%	" "
-200 mesh	20.2%	" "

ASSAYS:

	Au	Ag	Pb	Zn
Mill feed10 oz.	45.0 oz.	5.0%	10.0%
Unit Cell Concentrate.....	.50 oz.	400 oz.	58%	9%
Pb Cleaner Concentrate.....	.70 oz.	600 oz.	50%	12%
Combined Pb Concentrate.....	.60 oz.	470 oz.	55%	10%

*Silver Standard Mines, Limited, New Hazelton, B. C., Canada



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RECOVER COARSE MINERAL— REGRIND MIDDLEINGS

Any processing after recoverable minerals have been liberated is unnecessary, costly and old-fashioned metallurgy. There IS a better way!

Two mill-proven machines recover minerals as soon as freed in grinding circuit: Denver "Sub-A" Unit Flotation Cell and the Denver Selective Mineral Jig. Both warrant your serious investigation.

HOW TO ESTIMATE YOUR ADVANTAGES

Simple Ore Tests will tell: (1) particle size where mineral is freed; (2) Amount and grade of concentrate; (3) size and cost of equipment required. Your low cost for ore tests will be sent on request. No obligation.

WRITE FOR THESE BULLETINS



Bulletin No. F12-B, Denver "Sub-A" Unit Flotation Cell

Bulletin No. T4-B10, How to Schedule An Ore Test

Bulletin No. J2-B8, Denver Selective Mineral Jigs

U-5111

METAL AND MINERAL MARKETS

METALS

December '51

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50¢
	Lake. Delivered, destinations U.S.A.	24.625¢
	Foreign Copper. New York	27.50¢
LEAD:	Common Grade. New York	19.00¢
	Foreign lead. New York delivery. (Import price ceiling)	19.00¢
ZINC:	Prime Western. East St. Louis	19.50¢
	Foreign zinc. East St. Louis delivery. (Import price ceiling)	19.50¢
ALUMINUM:	Primary 30 pound ingots (99% plus). F.o.b. shipping points	19.00¢
ANTIMONY:	Bradley Mining Co.'s Elk Brand 99.5%. F.o.b. Cascade, Idaho	50.00¢
	Lone Star Brand. F.o.b. Laredo, in bulk	42.50¢
BISMUTH:	(In ten lots) price per pound	\$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots	\$2.55
COBALT:	97-99%, keg of 550 pounds	\$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50¢
MERCURY:	Flasks. Large lots, New York	\$220.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colborne, Ontario	56.50¢
TIN:	Grade A Brands. New York	103.00¢
TITANIUM:	(98.5%). F.o.b. Beverly, Massachusetts	\$7.00
GOLD:	United States Treasury price	\$35.00 per ounce
SILVER:	Newly mined domestic. United States Treasury price	90 1/2¢ per ounce
	Foreign. Handy & Harman	88.00¢ per ounce
PLATINUM:	\$90.00-\$93.00 per ounce

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	\$35.00 per unit
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr ₂ O ₃ .	
	3 to 1 chrome-iron ratio	\$43.00-\$44.00
	African (Transvaal). 48% Cr ₂ O ₃	\$34.00-\$35.00
	Turkish. 48% Cr ₂ O ₃ . 3 to 1 chrome-iron ratio	\$52.00-\$53.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ and a 2 to 1 ratio.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe	\$ 8.30
	Mesabi, Bessemer, 51.5% Fe	\$ 8.45
	Old Range, Non Bessemer	\$ 8.55
	Old Range, Bessemer	\$ 8.70
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long ton unit	\$1.10 to \$1.18
	Chemical grade. 80% MnO ₂ . Per ton	\$60.00
	Chemical grade, domestic, 70% MnO ₂ . F.o.b. mines	\$45.00
	U. S. Government ore purchase depot Deming, New Mexico.	
	Base price, \$6.10 per long dry ton for 15 % ore. Price increasing to \$76.00 for 40% ore. U. S. Government purchase depot Butte, Montana.	
	Base price, \$6.05 per long dry ton for 12 % ore. Increasing to \$40.42 for 30 % ore. U. S. Government purchase depot Phillipsburg, Montana.	
	Base price, \$6.43 per long dry ton for 15 % ore. Increasing to \$34.81 for 30% ore.	
MOLYBDENUM CONCENTRATE:	90% MoS ₂ . F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	\$1.00
TUNGSTEN CONCENTRATE:	60% WO ₃ . Per short ton unit	\$65.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus \$0.06 per ton mile (maximum of \$6.00). Rifle, Naturita, Uravan and Durango, Colorado; Salt Lake City and Monticello, Utah. Base price for 0.10% ore is \$1.50 per pound and ranges to \$3.50 per pound of contained U ₃ O ₈ plus \$0.75 per pound for each pound in excess of four pounds per short dry ton and an extra allowance of \$0.25 per pound for each pound in excess of 10 pounds. A development allowance of \$0.50 per pound is paid for all ores purchased.	
VANADIUM ORE:	Carnotite-Roscoelite. V ₂ O ₅ content, up to 10 pounds, in uranium ore paid for at \$0.31 per pound in ratio of 10 parts V ₂ O ₅ to 1 part U ₃ O ₈ .	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	\$12.50
	Oil Well grade. Packed in 100 pound paper bags	\$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF ₂ content per short ton F.o.b. Illinois-Kentucky mines	\$43.00
	Ceramic grade. Minimum CaF ₂ content, 95%	\$45.00
	Acid grade. 97% CaF ₂	\$60.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades. Crushed and sized. F.o.b. plants per short ton	\$7.00 to \$9.00
	Concrete grades. Crushed and sized	\$6.00 to \$8.00
	Oil Well Grades.	\$6.00 to \$9.00
SULPHUR:	Long ten, F.o.b. Gulf Coast mines	\$22.00

Quotations on metals and certain ores through the courtesy of American Metal Market, New York, N.Y.

Uludag, near the city of Bursa. Development work is being carried out by *Mining Research and Prospecting Institute of Turkey (MTA)* to determine the grade and the reserve of the deposit.

INDIA—Lignite deposits at Niveli, Madras state, are now considered economically workable after about four years of effort. Previously, there had been difficulties because of artesian springs. The deposit covers an area of 100 square miles and is estimated to contain 2,000,000 tons of high-quality lignite. It could be mined economically by open-pitting because the ratio of lignite to overburden is about 1:3, and particularly because of the existence of several layers of high alumina clays which may be used by the ceramic industries.

IRAN—About 8,000 tons of red oxide, reportedly containing a minimum of 70 percent ferrous oxide, are offered for export by the *Hormoz and Oushm Mines Company Plan Organization*, Tehran, Iran. Deliveries cannot be made until after February 21, 1952, however. A limited number of samples have been furnished to the United States Department of Commerce.

TURKEY—*Ozdemir Mining Company* which operates antimony mines in the vicinity of Turhal is negotiating to take over another antimony mine in the same area. The new mine is said to have a reserve of about 60,000 tons of ore.

INDIA—According to the *Deputy for Industries and Commerce*, 1,000,000 tons of high-grade manganese ore will be allowed to be exported from India during the current year. No destination control and no quantitative restriction on export of low-grade manganese ore has been made.

TURKEY—A gold deposit has been located in the province of Bursa. The average grade and tonnage has not yet been determined but it is said to be a low-grade deposit.

INDIA—During June 1951, the *Hatti Gold Mines* at Hyderabad produced 681.36 fine ounces of gold and treated 3,950 tons of ore. The corresponding figures for July were 912.67 fine ounces of gold and 3,640 tons of ore.

PAKISTAN—High-grade chromite is reported to have been discovered in Kalat state in West Pakistan.

TURKEY—The *United States Economic Cooperation Administration* has authorized the Turkish government to spend \$325,000 for iron and steel mill materials and products (except pig iron, ferro alloys, ferrous scrap, tinplate, terneplate and blackplate, semi-finished steel, blooms, billets, slabs, and sheet bars) from the United States.

INDIA—Financial stringency has compelled the government to abandon its scheme for the construction of a new steel plant. The only potential for increased output now lies in increasing the capacity of the two existing steel plants.

INDIA—The *Indian Copper Corporation* reports that its mill treated 386,156 short tons of ore during the year. Ore reserves at the end of the year were estimated at 3,087,195 short tons in the three mines, namely the *Mosaboni, Badia, and Dhobani*. Because of the shortage of sulphur in India, the company is considering the recovery of sulphur from sulphide ores.

TURKEY—Blister copper production at the *Etibank's Murgul smelter* is increasing. Recent smelting improvements including more accurate control of furnace charging and reduction of air leakages to the reverberatory furnace are contributing to this increase.

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

FREE-LITERATURE PREVIEW

To get any item of free literature illustrated or described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP coupon, and mail it to Mining World, 121 Second St., San Francisco 5, Calif.

SAND PUMP: For complete details of the new Wilfley Model K sand, slime, slurry pump, write or wire to A. R. Wilfley & Sons, Inc., Denver, Colo., or circle No. 1 on the PEP card.

PUMP AND MOTOR: Design and construction features of a close-coupled pump and motor, the electrifugal, are described in a bulletin just released by Allis-Chalmers Mfg. Company. It has a single shaft mounted in an exclusive unit-cast frame to assure perfect and permanent alignment. Circle No. 2 on PEP card for Bulletin 52B6140B.

NEW DENVER JAW CRUSHER: The Denver Equipment Company is now producing a new 10 by 20-inch jaw crusher in order that their line of Type "H" Forced Feed jaw crushers might be more complete. The new crusher is mounted on an electrically cast steel, one-piece frame and has reversible jaws and cheek plates of 13-14 percent manganese steel. For further information circle No. 3.

FLOTATION INDEX: The 1951 edition of Dow Chemical Co.'s Flotation Index, a complete guide to published material on flotation, is a must for mill men. Get your copy by circling No. 4.

THREE-PRODUCT HMS SEPARATION: The Akins separator is the heart of Colorado Iron Works Co.'s new HMS unit that produces concentrate, middling, and tailing in a single-stage operation. Get free information on the new unit by circling 5.

TRUCK HAULAGE COSTS: A new 4-page bulletin released by Cummins Engine Co., Inc., describes and gives operating costs for 15- and 22-ton Cummins-powered Euclid trucks for the years 1948 and 1949 at National Lead Company's Taha-wus, N.Y., operation. Circle 8.

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TRACK LINKS REPAIR: Caterpillar has developed a new method of resurfacing track links worn too deeply for the successful use of weld overlays. The method makes possible the resurfacing of links worn in excess of 3/8 inch. For full information circle No. 13.

SPUR-GEAR HOIST: The Challenger, a new Coffing spur-gear hoist, is available in 1/2 and 1 ton capacities. It features lightness, strength, and ease of servicing. Circle No. 14.

RUST INHIBITOR: For protection of boilers, flues, and pipes subject to rust and corrosion, ask for information on the new grades of Corrosanti by circling PEP No. 15.

PUMPING PROBLEMS: If you pump slimes, slurry, sands, or other solid-liquid mixtures, information on the complete line of pumps produced by Morris Machine Works will be useful in solving your pump problems. Circle No. 16.

ROPEOLOGY: For those who are interested in keeping their wire rope costs to a minimum, MacWhyte Company has published a new bulletin, "Wire Rope—So What?" To obtain a copy, circle PEP No. 21.

ORE ANALYSIS: The new Norelco Fluorescence Analysis Unit incorporates many design improvements to facilitate rapid analysis of constituents in metals, alloys, minerals, and ores. As distinguished from X-ray diffraction which gives precise data about atomic structure, Norelco's unit provides precise quantitative and qualitative data with respect to the elements present in minute amounts of solids, semi-solids and liquids. For further information, circle No. 26.

AERIAL SURVEYS: Abrams Aerial Survey Corporation has published a new booklet on the production and use of aerial photographs, topographic maps, and mosaics. To obtain this guide to aerial surveying, circle No. 27.

DIAMOND DRILLING: The Christensen Diamond Products Company has released new literature on the latest procedures and equipment recommended for modern diamond drilling. To obtain this material, circle No. 36.

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PEP Editor

MINING WORLD-WORLD MINING

121 Second St., San Francisco 5, Calif.

Please send me complete and free information on the following equipment described in your PEP section, and keyed by the numbers I have circled:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CIRCLE	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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DESIRE	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Also send further free information on the equipment advertised on page:

_____ ; Product _____ ; Manufacturer _____

_____ ; Product _____ ; Manufacturer _____

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

METAL AND MINERAL MARKETS

METALS

December '51

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50¢
	Lake. Delivered, destinations U.S.A.	24.625¢
	Foreign Copper. New York	27.50¢
LEAD:	Common Grade. New York	19.00¢
	Foreign lead. New York delivery. (Import price ceiling)	19.00¢
ZINC:	Prime Western. East St. Louis	19.50¢
	Foreign zinc. East St. Louis delivery. (Import price ceiling) ...	19.50¢
ALUMINUM:	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	19.00¢
ANTIMONY:	Bradley Mining Co.'s Elk Brand 99.5%. F.o.b. Cascade, Idaho	50.00¢
	Lone Star Brand. F.o.b. Laredo, in bulk	42.50¢
BISMUTH:	(in ton lots) price per pound	\$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots	\$2.55
COBALT:	97-99%, keg of 550 pounds	\$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50¢
MERCURY:	Flasks. Large lots, New York	\$220.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port	24.50¢
TIN:	Grade A Brands. New York	
TITANIUM:	(98.5%). F.o.b. Beverly, Massachusetts	
GOLD:	United States Treasury price	
SILVER:	Newly mined domestic. United States Treasury	
	Foreign. Handy & Harman	
PLATINUM:	

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons	
	African (Rhodesian). 48% Cr ₂ O ₃ .	
	3 to 1 chrome-iron ratio	
	African (Transvaal). 48% Cr ₂ O ₃ .	
	Turkish. 48% Cr ₂ O ₃ . 3 to 1 chrome-iron ratio	
	U. S. Government ore purchase depot Grants	
	lumpy ore, \$115.00; fines and concentrates \$1	
	a 3 to 1 chromium-iron ratio. Premiums for h	
	ratio up to 3.5 to 1. Penalties for grades do	
	to 1 ratio.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Paris.	
	Mesabi, Non Bessemer, 51.5% Fe	
	Mesabi, Bessemer, 51.5% Fe	
	Old Range, Non Bessemer	
	Old Range, Bessemer	
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long	
	Chemical grade. 80% MnO ₂ . Per ton	
	Chemical grade, domestic, 70% MnO ₂ , F.o.b.	
	U. S. Government ore purchase depot Damin	
	Base price, \$6.10 per long dry ton for 15	
	\$76.00 for 40% ore. U. S. Government purch	
	Base price, \$6.05 per long dry ton for 12 %	
	for 30 % ore. U. S. Government purchase de	
	Base price, \$6.43 per long dry ton for 15 %	
	for 30 % ore.	
MOLYBDENUM	90% MoS ₂ . F.o.b. Climax, Colorado. Per pound	
CONCENTRATE:	molybdenum, plus cost of containers ..	
TUNGSTEN	60% WO ₃ . Per short ton unit	
CONCENTRATE:		
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot	
	(maximum of \$6.00), Rifle, Naturita, Uravan and Urango, Colorado;	
	Salt Lake City and Monticello, Utah. Base price for 0.10% ore is \$1.50	
	per pound and ranges to \$3.50 per pound of contained U ₃ O ₈ plus	
	\$0.75 per pound for each pound in excess of four pounds per short	
	dry ton and an extra allowance of \$0.25 per pound for each pound	
	in excess of 10 pounds. A development allowance of \$0.50 per pound	
	is paid for all ores purchased.	
VANADIUM ORE:	Carnotite-Roscoelite. V ₂ O ₅ content, up to 10 pounds, in uranium ore	
	paid for at \$0.31 per pound in ratio of 10 parts V ₂ O ₅ to 1 part U ₃ O ₈ .	

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in	
	carload lots	\$12.50
	Oil Well grade. Packed in 100 pound paper bags	\$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF ₂ content per short	
	ton F.o.b. Illinois-Kentucky mines	\$43.00
	Ceramic grade. Minimum CaF ₂ content, 95%	\$45.00
	Acid grade. 97% CaF ₂	\$60.00
PERLITE:	Crude. F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades. Crushed and sized. F.o.b. plants	
	per short ton	\$7.00 to \$9.00
	Concrete grades. Crushed and sized	\$6.00 to \$8.00
	Oil Well Grades.	\$6.00 to \$9.00
SULPHUR:	Long ton, F.o.b. Gulf Coast mines	\$22.00

Quotations on metals and certain ores through the courtesy of American Metal Market, New York, N.Y.

Uludag, near the city of Bursa. Development work is being carried out by *Mining Research and Prospecting Institute of Turkey (MTA)* to determine the grade and the reserve of the deposit.

INDIA—Lignite deposits at Niveli, Madras state, are now considered economically workable after about four years of effort. Previously, there had been difficulties because of artesian springs. The deposit covers an area of 100 square miles and is estimated to contain 2,000,000 tons of high-quality lignite. It could be mined economically by open-pitting because the ratio of lignite to overburden is about 1:3, and particularly because of the existence of several layers of high alumina clays which may be used by the ceramic industries.

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PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

FREE-LITERATURE PREVIEW

To get any item of free literature illustrated or described in the Production Equipment Preview, note the key number of that item. circle the cor-

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AGES SSING

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 City _____ Zone _____ State _____

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METALS

December '51

COPPER:	Electrolytic. Delivered F.o.b. cars, destination U.S.A.	24.50¢
	Lake. Delivered, destinations U.S.A.	24.625¢
	Foreign Copper. New York	27.50¢
LEAD:	Common Grade. New York	19.00¢
	Foreign lead. New York delivery. (Import price ceiling)	19.00¢
ZINC:	Prime Western. East St. Louis	19.50¢
	Foreign zinc. East St. Louis delivery. (Import price ceiling)	19.50¢
ALUMINUM:	Primary 30 pound ingots (99% plus). F.o.b. shipping points	19.00¢
ANTIMONY:	Bradley Mining Co.'s Elk Brand 99.5%. F.o.b. Cascade, Idaho	50.00¢
	Lone Star Brand. F.o.b. Laredo, in bulk	42.50¢
BISMUTH:	(In ton lots) price per pound	\$2.25
CADMIUM:	Sticks and bars. 1 to 5 ton lots	\$2.55
COBALT:	97-99%, keg of 550 pounds	\$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	24.50¢
MERCURY:	Flasks. Large lots, New York	\$220.00
NICKEL:	"F" ingots (5 pounds). F.o.b. refinery, Port Colborne, Ontario	56.50¢
TIN:	Grade A Brands. New York	103.00¢
TITANIUM:	(98.5%). F.o.b. Beverly, Massachusetts	\$7.00
GOLD:	United States Treasury price	\$35.00 per ounce
SILVER:	Newly mined domestic. United States Treasury price	90 1/2¢ per ounce
	Foreign. Handy & Harman	88.00¢ per ounce
PLATINUM:	\$90.00-\$93.00 per ounce

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO. F.o.b. mine, Colorado	\$35.00 per unit
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr ₂ O ₃ .	
	3 to 1 chrome-iron ratio	\$43.00-\$44.00
	African (Transvaal). 48% Cr ₂ O ₃	\$34.00-\$35.00
	Turkish. 48% Cr ₂ O ₃ . 3 to 1 chrome-iron ratio	\$52.00-\$53.00
	U. S. Government ore purchase depot Grants Pass, Oregon. Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ and a 2 to 1 ratio.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports.	
	Mesabi, Non Bessemer, 51.5% Fe	\$ 8.30
	Mesabi, Bessemer, 51.5% Fe	\$ 8.45
	Old Range, Non Bessemer	\$ 8.55
	Old Range, Bessemer	\$ 8.70
MANGANESE ORE:	Metallurgical grade. 46 to 48% Mn. Long ton unit	\$1.10 to \$1.18
	Chemical grade. 80% MnO ₂ . Per ton	\$60.00
	Chemical grade, domestic, 70% MnO ₂ , F.o.b. mines	\$45.00
	U. S. Government ore purchase depot Deming, New Mexico.	
	Base price, \$6.10 per long dry ton for 15 % ore. Price increasing to \$76.00 for 40% ore. U. S. Government purchase depot Butte, Montana.	
	Base price, \$6.05 per long dry ton for 12 % ore. Increasing to \$40.42 for 30 % ore. U. S. Government purchase depot Phillipsburg, Montana.	
	Base price, \$6.43 per long dry ton for 15 % ore. Increasing to \$34.81 for 30 % ore.	
MOLYBDENUM CONCENTRATE:	90% MoS ₂ . F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	\$1.00
TUNGSTEN CONCENTRATE:	60% WO ₃ . Per short ton unit	\$65.00
URANIUM ORE:	Carnotite-Roscoelite. F.o.b. purchase depot plus \$0.06 per ton mile (maximum of \$6.00), Rifle, Naturita, Uravan and Durango, Colorado; Salt Lake City and Monticello, Utah. Base price for 0.10% ore is \$1.50 per pound and ranges to \$3.50 per pound of contained U ₃ O ₈ plus \$0.75 per pound for each pound in excess of four pounds per short dry ton and an extra allowance of \$0.25 per pound for each pound in excess of 10 pounds. A development allowance of \$0.50 per pound is paid for all ores purchased.	
VANADIUM ORE:	Carnotite-Roscoelite. V ₂ O ₅ content, up to 10 pounds, in uranium ore paid for at \$0.31 per pound in ratio of 10 parts V ₂ O ₅ to 1 part U ₃ O ₈ .	

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	Ceramic grade. Minimum CaF ₂ content, 95%	\$45.00
	Acid grade. 97% CaF ₂	\$60.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
	Plaster grades. Crushed and sized. F.o.b. plants per short ton	\$7.00 to \$9.00
	Concrete grades. Crushed and sized	\$6.00 to \$8.00
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IRAN—About 8,000 tons of red oxide, reportedly containing a minimum of 70 percent ferrous oxide, are offered for export by the *Hormoz and Oashim Mines Company Plan Organization*, Tehran, Iran. Deliveries cannot be made until after February 21, 1952, however. A limited number of samples have been furnished to the United States Department of Commerce.

TURKEY—Ozdemir Mining Company which operates antimony mines in the vicinity of Turhal is negotiating to take over another antimony mine in the same area. The new mine is said to have a reserve of about 60,000 tons of ore.

INDIA—According to the *Deputy for Industries and Commerce*, 1,000,000 tons of high-grade manganese ore will be allowed to be exported from India during the current year. No destination control and no quantitative restriction on export of low-grade manganese ore has been made.

TURKEY—A gold deposit has been located in the province of Bursa. The average grade and tonnage has not yet been determined but it is said to be a low-grade deposit.

INDIA—During June 1951, the *Hatti Gold Mines* at Hyderabad produced 681.36 fine ounces of gold and treated 3,950 tons of ore. The corresponding figures for July were 912.67 fine ounces of gold and 3,640 tons of ore.

PAKISTAN—High-grade chromite is reported to have been discovered in Kalat state in West Pakistan.

TURKEY—The *United States Economic Cooperation Administration* has authorized the Turkish government to spend \$325,000 for iron and steel mill materials and products (except pig iron, ferro alloys, ferrous scrap, tinplate, terneplate and blackplate, semi-finished steel, blooms, billets, slabs, and sheet bars) from the United States.

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SAND PUMP: For complete details of the new Wilfley Model K sand, slime, slurry pump, write or wire to A. R. Wilfley & Sons, Inc., Denver, Colo., or circle No. 1 on the PEP card.

PUMP AND MOTOR: Design and construction features of a close-coupled pump and motor, the electrifugal, are described in a bulletin just released by Allis-Chalmers Mfg. Company. It has a single shaft mounted in an exclusive unit-cast frame to assure perfect and permanent alignment. Circle No. 2 on PEP card for Bulletin 52B6140B.

NEW DENVER JAW CRUSHER: The Denver Equipment Company is now producing a new 10 by 20-inch jaw crusher in order that their line of Type "H" Forced Feed jaw crushers might be more complete. The new crusher is mounted on an electrically cast steel, one-piece frame and has reversible jaws and cheek plates of 13-14 percent manganese steel. For further information circle No. 3.

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"FACTS" BOOK: BFM Industries Incorporated has produced a new book, using a photo-narrative style, that describes the methods they have developed to rebuild and redesign motors and generators for special needs. Circle PEP No. 11.

DETERMINING SPECIFIC GRAVITIES: A five-page brochure describing the twenty-two standard Cargille Heavy Liquids for the sink-or-float method of determining specific gravities of minerals ranging up to a gravity of 7.5 can be had by circling PEP No. 12.

TRACK LINKS REPAIR: Caterpillar has developed a new method of resurfacing track links worn too deeply for the successful use of weld overlays. The method makes possible the resurfacing of links worn in excess of 3/8 inch. For full information circle No. 13.

SPUR-GEAR HOIST: The Challenger, a new Coffing spur-gear hoist, is available in 1/2 and 1 ton capacities. It features lightness, strength, and ease of servicing. Circle No. 14.

RUST INHIBITOR: For protection of boilers, flues, and pipes subject to rust and corrosion, ask for information on the new grades of Corrosanti by circling PEP No. 15.

PUMPING PROBLEMS: If you pump slimes, slurry, sands, or other solid-liquid mixtures, information on the complete line of pumps produced by Morris Machine Works will be useful in solving your pump problems. Circle No. 16.

ROPEOLOGY: For those who are interested in keeping their wire rope costs to a minimum, MacWhyte Company has published a new bulletin, "Wire Rope—So What?" To obtain a copy, circle PEP No. 21.

ORE ANALYSIS: The new Norelco Fluorescence Analysis Unit incorporates many design improvements to facilitate rapid analysis of constituents in metals, alloys, minerals, and ores. As distinguished from X-ray diffraction which gives precise data about atomic structure, Norelco's unit provides precise quantitative and qualitative data with respect to the elements present in minute amounts of solids, semi-solids and liquids. For further information, circle No. 26.

AERIAL SURVEYS: Abrams Aerial Survey Corporation has published a new booklet on the production and use of aerial photographs, topographic maps, and mosaics. To obtain this guide to aerial surveying, circle No. 27.

DIAMOND DRILLING: The Christensen Diamond Products Company has released new literature on the latest procedures and equipment recommended for modern diamond drilling. To obtain this material, circle No. 36.

MILL DESIGN: The Galigher Company recently announced the publication of a comprehensive new catalog on improved flotation practice and mill design. For a copy of this valuable literature, circle No. 37.

SAMPLING MILL CIRCUITS: A new brochure is available that covers improved sampling methods with the Geary Jennings Sampler. A copy of the brochure can be had by circling No. 38.

AMALGAMATOR: The Titan Amalgamator, manufactured by Mill & Mine Supply, Inc., is a simple, economical rotary unit for amalgamation to recover free gold. For full details, circle 7.

PEP Editor

December '51

MINING WORLD-WORLD MINING

121 Second St., San Francisco 5, Calif.

Please send me complete and free information on the following equipment described in your PEP section, and keyed by the numbers I have circled:

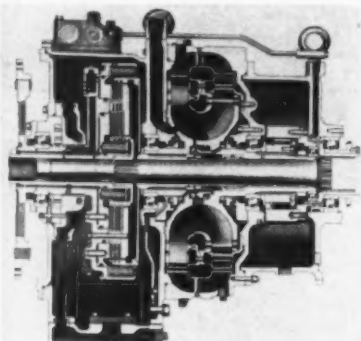
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CIRCLE	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
NUMBERS	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
YOU	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DESIRE	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

Also send further free information on the equipment advertised on page:

_____; Product _____; Manufacturer _____
 _____; Product _____; Manufacturer _____
 Name _____ Title _____
 Company _____
 Address _____
 City _____ Zone _____ State _____

Hydraulic Converter Reduces Forward Shifting

The Twin Disc Clutch Company has reported the development of a new three-stage hydraulic torque converter



transmission which reportedly eliminates 99 per cent of forward gear shifting on the toughest grades and, when combined with engine drag, performs 90 per cent of the braking necessary on favorable grades.

The results from field testing under some of world's most grueling hauling requirements on the Mesabi Iron Range have indicated that the new unit, used with a closely spaced transmission, provides the smoothest and most efficient use of power yet developed for trucks hauling loads up to 30 tons on grades up to 13 percent. For your copy of the new bulletin describing this converter circle no. 76.

Denver Concern Lends Air Loco for School Use

Clifton W. Livingston, head of the mining department at Colorado School of Mines, brings a Universal Tramaire into



the portal of the school's experimental mine, where students studied practical mining this summer. The classes covered operation and maintenance of equipment in sampling, drilling, blasting, mucking, diamond and blasthole drilling, timbering, drifting, raising, sinking, stoping, and tramming. The Tramaire, a 6-hp. commercial model similar to those now in operation in Coeur d'Alene and Colorado mines, was loaned to the school by Universal Dredge Manufacturing Co. Circle 95 for more information on the 6-hp. Tramaire.

Link-Belt Publishes New Vibrating Screen Catalog

A complete, new 20-page illustrated Book No. 2377 on Model "UP" Vibrating Screens for the fast, accurate dry-screening of light and fine materials, and

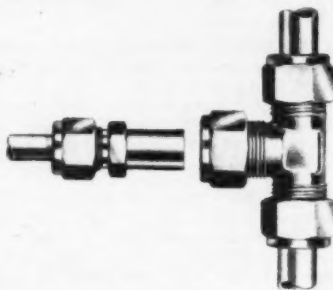
Model "NRM" Liquid Vibrating Screens for the low-cost, high speed separation of solids from liquids has been published by Link-Belt Company.

Both types of screens are available in a wide range of sizes. The "UP" can be furnished with single or multiple decks, and with semi-enclosed or totally enclosed steel housings where required.

Descriptive material includes specific information on how to select the right screen and screen cloth for maximum operating efficiency; dimension tables, weights, horsepower requirements; and other data of value to the engineer and plant operator. A copy of new Book No. 2377 will be sent to any interested reader upon request. Circle 96.

New Tubing Reducers and Fittings Available

The Crawford Fitting Company has announced the development of its new Swagelock fittings designed to provide



assemblies that are torque-free and leak-proof with a minimum amount of work and maintenance.

The fittings are available in brass, aluminum, steel, stainless steel, and Monel in sizes from 1/8 inch to 1/2 inch, outside diameter. They will hold heavy or thin wall tubing of metal or plastic equally well. For complete information circle No. 71.

New Arizona Distributor For Bucyrus-Erie Company

The State Tractor & Equipment Company, 407 South 17th Avenue, Phoenix, Arizona, was recently appointed distributor in Arizona for Bucyrus-Erie 1/2- to 4-yard gasoline, diesel and single-motor electric convertible excavators; 2- and 3-ton Hydrocranes and the recently introduced Hydrohoe, according to an announcement by Bucyrus-Erie Company. State Tractor & Equipment Company will continue to handle Bucyrus-Erie tractor equipment—Bullgraders, bulldozers, Dozer-Shovels and scrapers designed for use with International crawler tractors.

Jaw Crusher With Rolling Toggle Reduces Costs

Latest modification to the basic design of its "A-1" jaw crusher is the dry rolling toggle, according to an announcement by Allis-Chalmers Manufacturing Company. Company engineers say that the new design results in reduced wear and maintenance and contributes to increased safety. Since the toggle ends roll rather than slide on the mating toggle seats, the least wear is induced.

The dry rolling toggle also incorporates a safety shear member on the portion between the pitman and the frame. If a large timber or piece of scrap metal is accidentally fed into the crusher, inexpensive rivets will shear off, thus averting what often may be a major repair. The rivets are easily replaced in the field. To assure a rolling action between mating toggle ends, a high coefficient of friction is desirable. Consequently, no lubrication is required, resulting in a substantial saving in the cost of lubricant. Since no lubricant is used, it is easy to keep the pit under the crusher clean and dry; an increased safety factor.

Further information can be obtained by circling PEP no. 77.

Latest Designs of Belt Idler Equipment Given

Chain Belt Company of Milwaukee announces the availability of its new bulletin on Rex belt-conveyor idlers and machinery.

The book contains information on all of the latest designs, developments and care of this equipment. There are two pages of general engineering information to help in designing and specifying belt-idler equipment.

The latest information on the new Rex Style No. 33RA return-belt-training (self-aligning) Idler is given, together with material on the newly developed Styles No. 40 and 46 steep-angle troughed-belt idlers and Styled No. 33G and 33WC steep-angle troughed-belt-training (self-aligning) idlers. Latest data on lubrication material and techniques, and detailed description of zipper bunker seals and belt-conveyor trippers are included. For a copy of bulletin No. 51-58, circle 91.

Extend Digging Depth With Back Hoe Attachment

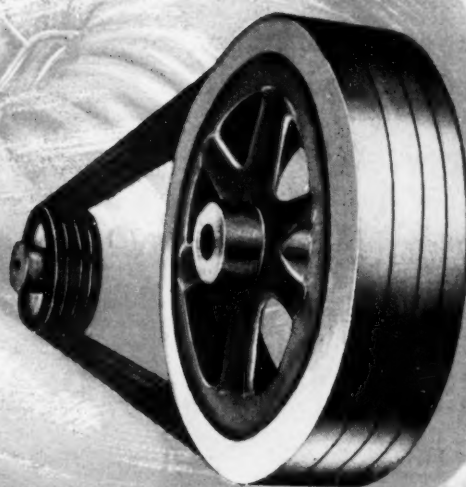
A newly designed hoe attachment for the Koehring 304 excavator will increase the machine's digging depth to 19 feet, 9 inches, according to a recent announcement by the manufacturer. Other im-



provements made on the model 304 provide extra resistance to side sway and extra strength to meet any operating condition for below ground level excavating.

Officially rated as a 3/4 yard excavator, the 304's dipper arm is pivoted at the end of the boom and jackknives to dig a vertical backwall, reducing hand cleanup time to a minimum in foundation excavating. Additional information and complete specifications can be obtained by circling no. 74.

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Minerals Engineering Big Supplier for AEC Mill

The Minerals Engineering Company is one of the largest independent suppliers of uranium-vanadium ore to the U. S. Atomic Energy Commission's Monticello, Utah mill. The ore is mined in the Temple Mountain district of Grand county, Utah; in the Slick Rock district of San Miguel county, Colorado; and in the Lukachukai Mountains of Apache county, Arizona. Minerals Engineering has head offices in Grand Junction, Colorado and its far flung interests are directed by Blair Burwell, president, and Ray Sullivan, manager. Besides mining and shipping ore the company has \$750,000 worth of diamond and non-coring drilling contracts with the AEC and is drilling approximately 50,000 feet of exploratory holes a month in Colorado, Utah, and Arizona. A total of 144 men are employed by the company.

The latest addition to the company is the electronic department which developed and is building and marketing a new type of Gamma ray counter which is finding widespread use on the Colorado Plateau. The counter is used to "assay" ore in the mine or ready for shipment in percentage of U₃O₈. Results to date have been accurate within two percent of those obtained by the chemical method for U₃O₈ determination.

COLORADO

Vanadium Corporation of America has leased from Hetzer Mines, Inc. the latter's tungsten mill located at Nederland,

Colorado. Vanadium will enlarge the capacity of the mill in order to process tungsten ores from Boulder County mines. A purchase schedule has been set up whereby Vanadium will purchase ores from local sources. The company has also started a new roaster at its Durango, Colorado vanadium-uranium plant. This brings the number of roasters at the plant to two. Carnotite and roscolite ore from the company's mines, and ore purchased from independent producers in Colorado, Utah, New Mexico, and Arizona, is trucked to the plant for processing. D. W. Viles, vice president in charge of mining for VCA, is in charge of the Durango plant.

The *Idarado Mining Company* has started a new deep-level crosscut adit near Pandora, San Miguel county, Colorado. The new adit will be driven to the Ajax vein. A raise will be driven on the vein from the new tunnel to the Mel-drum tunnel in which Idarado has been conducting an extensive development program. Idarado operates the *Blackbear* mine through the Treasury Tunnel portaled in Ouray county. John Wise is in charge of mining operations for Idarado, and William Nelson of Telluride is supervising the new tunnel and the Mel-drum operations.

The *Shenandoah-Dives Mining Company* at Silverton, San Juan county, Colorado is concentrating on development and stoping operations on the Silver Lake vein. Activity on the Shenandoah-Dives-Mayflower vein is largely confined to pulling broken ore from shrinkage stopes. Charles Chase of Silverton is company vice president.

The course of the *Leadville* drainage tunnel was changed when underground crews swung directly eastward toward Breece Hill in starting the *New Mikado* lateral and the final 2,000-foot leg of the project. They hope to cut the Mikado and Iron faults beyond the New Mikado shaft. Work was suspended in the Down-

town lateral after a 300-foot stub was provided that will enable claim owners on the west to tap into the tunnel. Under the direction of Edward Matsen, resident engineer of the U.S. *Bureau of Mines*, and Harry Greshuk, project manager for the *Utah Construction Company*, passed the 10,000-foot mark and continued 107 feet before turning east. Water from the obstructed *Robert Emmet* shaft, which was tapped by long drill holes in passing, is now pouring into the tunnel at the rate of some 500 gallons per minute. Water from other mines of the *Fryer Hill* and *Carbonate Hill* basins ultimately will find its way into the tunnel through connected workings as well as the many fissures and faults.

The *Ozark Mahoning Company* is planning to build a 250-ton-per-day fluorspar flotation mill at its fluorspar properties near Cowdrey, Jackson county, Colorado. Ozark Mahoning has been carrying on an extensive underground development program at properties of the *Colorado Fluorspar Corporation* under the direction of Mike Cloonan.

The *Aztec Mining Company* has leased the *Iron Clad* mine at Rico, Dolores County, Colorado from Jones and Sons. Operations have just started and an electric powered compressor has been installed. E. Edwards is in charge of operations.

Joseph M. Bradley and associates are shipping 50 tons of zinc-lead-gold-silver ore daily from their *Silver Ledge* mine to the custom mill unit of the *Shenandoah-Dives Mining Company* at Silverton, Colorado. The mine is located adjacent to Colorado State Highway No. 550 and is on the southern side of Red Mountain Pass at an elevation of 11,000 feet. The ore is mined by a gasoline shovel from a small open pit and trucked to Silverton.

The *Minerals Engineering Company* of Grand Junction, Colorado has a seven-man crew at its *Monogram* uranium-

TREASURE MOUNTAIN DRIFTS AND RAISES ON SCOTIA VEIN

The *Treasure Mountain Gold Mining Company* has signed a contract with the Defense Minerals Administration covering the expenditure of \$75,200 at *Treasure Mountain's* Sandiogo tunnel in San Juan County, Colorado. Under the terms of the contract, each party will supply one half of the money. The exploration work outlined in the contract is for 1,200 feet of drifting on the Scotia vein, cut by the Sandiogo tunnel some 1,600 feet from the portal. Following completion of the northeasterly and southwesterly drifting, about 800 feet of raises will be driven on the vein at points to be determined by *Treasure Mountain* and government engineers. All-winter operations at the mine, pictured here, are planned in accordance with an agreement between the company and a crew of miners.





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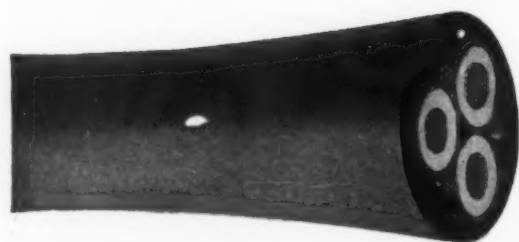
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vanadium mine in Montrose County, Colorado. Ray Sullivan is vice president in charge of mining for the company.

Construction of 162 miles of hard-surfaced arterial highway from Whitewater to Dove Creek, Colorado has been authorized and congressional appropriation of \$1,500,000 has been made for its construction. The road will be through the heart of the Colorado Plateau uranium-vanadium region and will speed up ore transportation to processing plants at Grand Junction, Uravan, Naturita, and Rifle, Colorado. An additional \$800,000 has been appropriated for the construction of roads from mines to the arterial highway. The request for the appropriation was made by the U. S. Atomic Energy Commission as a part of the needs for expanding uranium output in the region. Governor Dan Thornton of Colorado, Blair Burwell, President of the Colorado Mining Association, State Senator Stephen L. R. McNichols of the Long Range Planning Board of Colorado, and Mark Watrous, State Highway Engineer of Colorado, carried the fight to Washington to secure the appropriation through Senators Eugene Millikin and Edwin C. Johnson and Congressman Wayne N. Aspinall.

WYOMING

Idle for fifty years, the Copper King mine in the Silver Crown mining district near Cheyenne, Wyoming, is being reopened by Patrick W. Dinneen and Harry Ferguson of Cheyenne. The Copper King shaft has been cleaned out and dewatered to the 140-foot level, with ladders installed to the 130-foot level.

Five cars of uranium ore have been shipped from surface workings of the Wyoming Uranium Corporation's property near Lusk, Wyoming, to the Vitro Chemical Company plant at Salt Lake City. The ore is said to occur principally as uranophane and the uranium content is said to be about 0.25 to 0.30 percent U₃O₈. Charles O. Parker, Denver, Colorado, president of the company, is endeavoring to have the AEC diamond drill the deposit.

UTAH

The Excaliber Uranium Corporation of Grand Junction, Colorado, has started mine development at its Danise group of claims at Bow Knot, Emery county, Utah. The corporation also has stacked claims and is prospecting on its Hell Roaring Canyon claims in Grand county, Utah. Because of the remoteness and inaccessibility of the area in which the claims are located, all personnel and equipment has been air-lifted to the property. Nine airstrips are in use to speed transport to the various claims. A two-mile-long road is now being built into the area from Spring Canyon. Stepped up exploration and development is planned as improved transportation is available. Underground development is continuing under the direction of Vance E. Thornburg. The corporation office is at Grand Junction, Colorado.

DECEMBER, 1951

Lead-zinc ore is being milled by Metal Producers Inc., Milford, Utah, from the Horn Silver mine after six years of exploration and development. The mine has been completely reopened to the 1,000-foot level and equipped with modern machinery. It is capable of producing up to 500 tons of ore daily, while the mill is able to handle 350 tons daily. George W. Clemson of Los Angeles is president and general manager; D.C. Peacock is superintendent in charge of production.

The Columbia Iron Mining Company has received a certificate of necessity from the DPA permitting a five year tax amortization of facilities to increase iron ore output at its open pit iron mines in Iron County, Utah.

A recent shipment of high-grade ore from the Wasatch Drain Tunnel, at Alta, Utah, operated by the Zenda Gold Mining Company, returned \$51 a ton at

the smelter. Shipments of larger quantities of ore are being prepared. Zenda leases the 700-acre property from Wasatch Mines Company. The existing 5,500-foot tunnel is being extended to tap a number of well-defined fissures which produced quantities of ore some years ago.

A report on the uranium resources in the Silver Reef (Harrisburg) district, Washington county, Utah, has been released by the Geological Survey as a guide for prospecting and mining in the district. The Silver Reef district, located near Leeds, is a former important silver-producing area. No ore was mined for its uranium content until 1950 when 8.68 tons of rock containing 0.67 percent U₃O₈ and 3.75 percent V₂O₅ was shipped. Additional information may be obtained from the Denver Information Office of the Geological Survey, 468 New Customhouse, Denver, Colorado.

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This crushing plant was maintaining the rolls with a 50¢ rod, applying an average of 40 lbs. *every night* and 100 lbs. on weekends. In addition to this hard rod cost of \$170 there was an average of 85 welding hours a week, or a combined total of \$360 weekly.

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Government Chrome Depot Busy At Grants Pass

Over 1,000 tons of chrome ore has been purchased at the Grants Pass, Oregon, ore-purchasing depot, located about one mile west of Grants Pass on the Grants Pass-Marble Mountain line of the C. & O. C. Railroad. A new siding has been completed and will be used to speed rail shipment of the ore which is trucked to the depot from the mines. A new truck-weighing scale of 40,000-pounds capacity has also been finished.

Among those shipping to the depot are: Joe Inman from his Inman mine located near the Illinois River below the Oregon Chrome mine; George Clark, who has shipped over 100 tons of ore from the Black Diamond mine near Bolan Lake and just north of the California state line; and Dana Bowers, who has shipped concentrates from a small mill at the Harry Sordy property of Briggs Creek. It is anticipated that winter weather will slow shipments of ore but that miners will concentrate on development work from which larger production will result in 1952.

Oregon explorations for chrome include the Chetco Mining Company in Curry county; Roy Hillis at the Jack Shade property in Josephine county; Grissom Bros. from the Deep Borge mine, Josephine county; William Robertson from the Oregon Chrome mine, Josephine county; Ed Carlson from the Holiday mine, Josephine county; Dr. Thompson from the Cox mine, Josephine county; and R. McCaleb from the McCaleb mine, Josephine county.

In Del Norte county, California exploration work is being carried out at the Tyson mine near Gasquet. W. S.

Robertson is shipping development ore mined from a crosscut and raise at the Oregon Chrome mine in Siskiyou county. Another California shipper is Eugene Brown from the High Plateau mine in Del Norte county.

Merger Of 10 Properties Proposed For Coeur d'Alene

An unprecedented merger of 10 or more mining properties in northern Idaho's Coeur d'Alene mining region is reportedly being attempted by a recently incorporated firm, Silver Mountain Lead Mines. The merger would do away with extralateral rights problems and enable the entire area to be economically explored from a central adit and shaft, it is claimed.

Silver Mountain has offered to divide its shares among the old companies in return for their properties totaling more than 125 mining claims and mineral rights. Division of the shares on an equitable basis, admittedly a major problem, had not been worked out at last reports.

The consolidated holdings would be explored and developed by Sullivan Mining company, owned jointly by Bunker Hill & Sullivan and Hecla mining companies, in return for a half interest in the consolidated area. Properties involved are in the Hunter mining district east of Mullan, Idaho. They are Vindicator Silver-Lead, Idaho Silver, O'Brien Gulch Silver-Lead, Fortune, Princeton, Eastern Lead, Snowstorm, Coughlin group, Worthington ranch homestead and the Lucky Boy, owned by Bunker Hill & Sullivan.



A truckload of silver-lead concentrates was shipped to Bunker Hill smelter at Kellogg, Idaho, by leasers of the White-delf mine at Clark Fork. The ore came from a new stope in the Thompson & Gregg lease in the south end of the property. The shipment assayed at 41.9 percent lead, 4 percent zinc, and 329.5 ounces of silver per ton. Compton I. White who controls the White-delf property, recently brought it and the Clarinda and Copper Giant under one controlling interest.

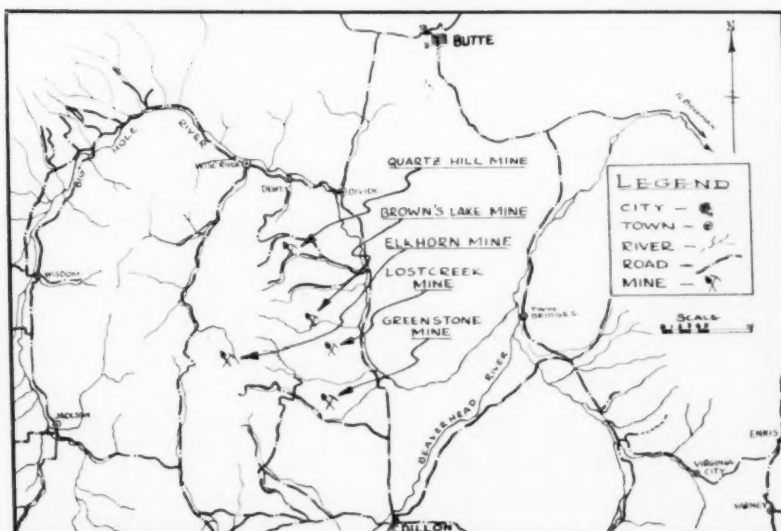
A mineralized vein nine feet wide was cut on the main adit tunnel level crosscut by Nabob Silver-Lead Company. The company is reported to have received DMA approval for a \$71,725 loan for exploration.

American Smelting and Refining Company has done more than \$60,000 worth of surface bulldozing and road work at the Silver Buckle property near Wallace, Idaho, since an option agreement was signed last spring, according to Dr. F. E. Scott, Silver Buckle president.

Lucky Friday Silver-Lead Mines Company recently opened two feet of solid high-grade and two feet of milling ore in the main Lucky Friday vein on the new 2,000-foot level of the mine near Mullan, Idaho. John Sekulic, president, said a sample from the high-grade sector assayed 82 ounces of silver, 57 percent lead, and 3 percent zinc. He estimated known ore reserves would maintain production at the current rate of 50 tons

MONTANA SCHEELITE DISCOVERIES OF MAJOR INTEREST

The index map shown here gives the location of the newest tungsten district in the United States. Surface trenching and diamond drilling have indicated a large tonnage of low grade scheelite ore. A major claim holder in the area is the Minerals Engineering Company of Grand Junction, Colorado who are interested in the Greenstone and Lost Creek mines. Blair Burwell is president of the company and has proposed that the Domestic Manganese and Development Company's flotation plant at Butte be used for concentrating ore from the district and that a chemical plant be built to produce "synthetic" scheelite from the flotation concentrate. The American Alloy Metals, Inc. headed by E. A. Julian and Frank Eichelberger control the Brown's Lake deposit.



daily for 10 years. He said output will be stepped up to 150 tons when manpower permits.

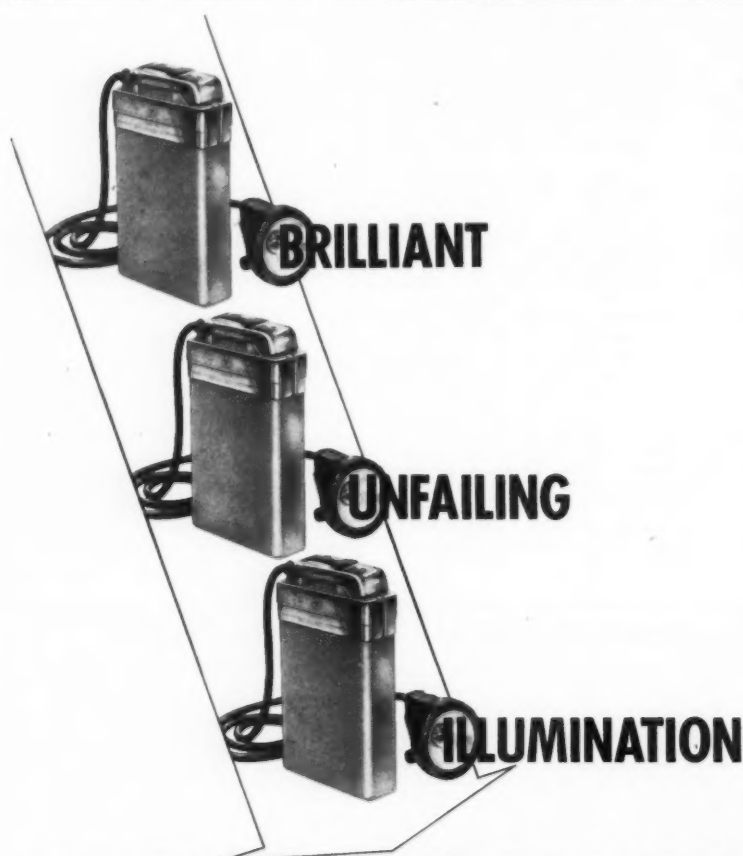
The first carload of lead concentrates has been shipped from the *Livingston* mine by *Idaho Custer Mines, Inc.*, at Mackay, Idaho. Shipments for the first month, October, netted the company around \$30,000 after smelting and handling charges had been deducted. An extensive development program is planned, including installation of a large hoist and other machinery for largescale production. A new air compressor has already been added.

A program of sampling and surveying is being carried out at the *Gold Ridge* mine of the *Leesburg Mining Company* at Leesburg, Idaho. Reopening of the mine workings has been carried out by Laurence Antonette, company president, and associates. G. Elmo Shoup of Salmon is company representative.

About 1,000 feet remain before the exploration crosscut being driven easterly from the 3,650-foot level of the *Morning* shaft enters the westerly portion of *Independence Lead Mines* property at Mullan, Idaho. *Federal Mining and Smelting Company* is doing the work under terms of an agreement with *Day Mines Inc.* which has a thirty-year lease on *Independence* holdings. A crew of men are rehabilitating the *Gold Hunter* shaft from which deep level crosscutting into the eastern part of *Independence* ground is planned.

Silver Summit Mining Company, Wallace, Idaho, reports east and west drift headings in 25 feet or more from the raise station above the 3,000-foot level. Development work is continuing with another raise planned from the 3,000-foot level several hundred feet further west. The two will be connected on the 2,800-foot level. *Merger Mines Corpora-*

tion whose property adjoins *Silver Summit* on the west is encouraged by the recent ore encounters of *Summit*, and of *Coeur d'Alene Mines* on the east. The latter has disclosed "at least one new persistent vein structure in a zone of strong bleaching and shearing." C. H. Hunter, president of *Merger*, says that there may be a connection between "those features exposed by *Coeur d'Alene Mines* to the east and similar features exposed by *Silver Summit* to the west of *Merger*." Further exploration of *Merger* ground is probable. Development work this year has consisted of surface work to patent eight additional claims, and 500 feet of diamond drilling in the extreme north end from *Coeur d'Alene Mines'* 2,800-foot level.



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An initial shipment of uranium-bearing ore from the *Haynes* property near Alhambra Hot Springs, Montana, was made recently by Dewey Hinman and Buford Miles, Helena, and Wayne Hinman, Clancy, Montana, lessees. This was the first shipment from the *Clancy* mining district, in Jefferson county, Montana. It contained 46,270 tons, and assayed over 1.0 percent U_3O_8 . Shipment was made to the *Vitro Chemical Company*, Salt Lake City, Utah. Discovery of the prospect was made by Wayne Hinman. The vein is about 30 inches in width.

An important tungsten vein has been found in the old *Combination* silver mine in the Black Pine mining district, northwest of Phillipsburg, Montana, and in the adjoining *Betsy Cook* property, the U.S. Bureau of Mines reports. The Bureau trenched, core-drilled, and sampled the vein.

Western Montana Exploration and Development Company has been organized by the mining partnership of Roy W. Key, Missoula, Montana, and O. J. Durand, Hall, Montana, to take over development of the *Durand* zinc-lead-copper property 10 miles southeast of Hall under a \$66,500 DMA exploration contract.

A DMA loan of \$25,290 awarded to the *Commonwealth Lead Mining Company* will be used for 1,200 feet of drifting on the ore channel of company property near Melrose, Montana, and to purchase about \$16,800 worth of additional equipment. The company is matching the funds, making the total for the project \$50,580. The company is now shipping 15 tons weekly of lead-silver ore and expects to increase shipments to 50 tons weekly in a short time.

For mining exploration in Montana, the DMA has granted loans to the following: *Ambassador Mines Corporation*, who recently started a diamond drilling program, \$11,534.50 of \$24,049 for lead-zinc exploration in Sanders county; *Hughesville Silver-Lead Mining Company*, Hughesville, \$5,000 of \$10,000 for lead exploration in Cascade county; *Pittsburgh Silver Mining Company*, \$5,585 of \$11,170 for lead-zinc exploration, including opening up an old tunnel, near the *Nancy Lee* mine, Superior; William B. McLure, Phillipsburg, \$12,286.50 of \$16,382 for tungsten exploration on the *Bear* and *Float* claims in Granite county.

MINING WORLD

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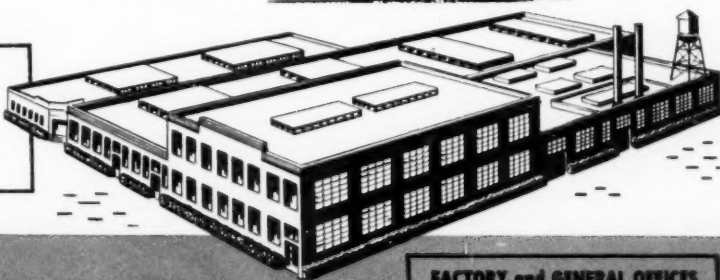
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THE AMERICAN RUBBER MANUFACTURING COMPANY

The Elkhorn Mining Company also received DMA approval of three loans granted the company through exploration contracts on three of its radioactive mineral properties. The first loan was granted to *Free Enterprise* uranium property located near Boulder, Jefferson county, Montana, where development of uranium-silver orebodies has been carried on over the past two years and from which commercial uranium shipments have been made. Diamond drilling and drift development on the *Free Enterprise* uranium vein are proceeding under plans of the exploration contract. A second loan

was granted for exploration of the *Forty-Niner* uranium property now under a long-term lease to Elkhorn. A 300-foot crosscut will be driven to cut one of the uranium veins on this property, located near Clancy, Montana. A third loan provides for Elkhorn's thorium-uranium-rare earths property near 9rmstead, in Beaverhead county, work now initiated to include dozer excavations across the orebodies, together with diamond drilling. The government's participation in each of the radioactive projects is understood to be 90 percent of total exploration costs.

Clark Mines, Inc. of Elliston, Montana has been incorporated for \$100,000. Directors are W. L. Henderson of Elliston, J. C. Ogilvy and Eugene Lyonnaise of Spokane.

WASHINGTON

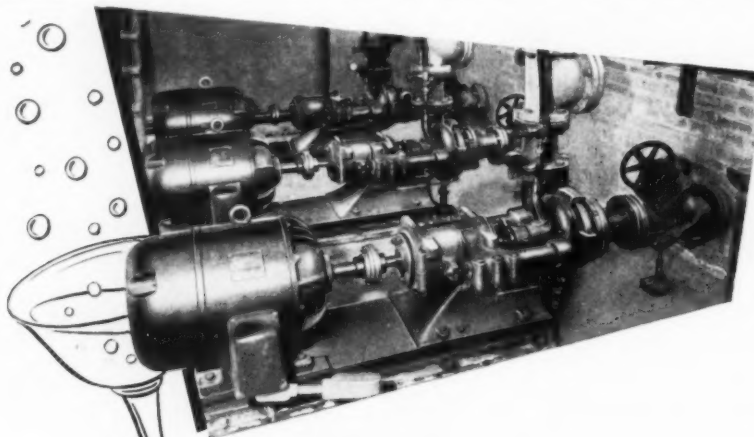
Germania Consolidated Mines, Inc., Spokane, has announced plans to build a new mill at its tungsten property in southwestern Stevens county, Washington. Cy Garber, Kellogg, Idaho, millwright and metallurgist, is designing the mill building and preparing a flow sheet, according to E. I. Fisher, secretary-treasurer. It is hoped to get better tungsten recovery and to save molybdenum content now being lost in tailings. The firm has shipped more than 7,000 pounds of jig concentrates running over 70 percent WO₃ since mining was resumed last spring. Shipments are to *Kennametal, Inc.*, Latrobe, Pennsylvania. Table concentrates are being stored for additional treatment to remove iron-sulphur content when new milling machinery is installed. Twelve men are working under direction of H. W. Traver.

Anaconda Mining Company is driving a third exploratory tunnel on the *Keegan* ground adjacent to the *E. H. Lovitt* Company operations at the *Golden King* mine three miles south of Wenatchee, Washington. The *Golden King* is yielding more than 200 tons of gold-silver ore daily.

John Russell and George M. Gibson of Twisp, Washington have taken a lease on the old *Red Shirt* mine, three miles southeast of Twisp, and are installing a crusher, 25-ton ball mill, and two tables on the property. They expect to be in operation about April 1, 1952, and expect to ship 300 tons of silica per month to the *American Smelting and Refining Company's* smelter at Tacoma. Five Pachucha tanks now installed will be used to cyanide a large tailing dump on the mill premises. About 30,000 tons of ore is estimated to be available for immediate mining. The lessees also will develop the TV mine on Alder Creek and the *Chicamun* mine on McClure Mountain, both in the Methow Valley, Washington.

A 100- to 150-ton capacity mill is being considered by *Pioneer Mining Company*, Stevens county Washington's newest shipper, according to manager Darrell A. Newland of Colville, Washington. Between 60 and 70 tons of silver-lead-zinc ore are being trucked daily to the Young America concentrator at Bossburg. A crude ore test shipment to the smelter at Trail, British Columbia averaged 55 ounces silver, 9 percent lead, and 10 percent zinc. Ore is being mined in an open cut over a width of 35 feet and length of 150 feet. The deposit was opened by bulldozing a mineralized outcropping. Production was started 100 days after start of work, which included building 1½ miles of road to the property 14½ miles northeast of Colville in the Old Dominion mining district.

Lead-gold-silver-zinc ore from a shallow winze at the *Mullen* mine six miles east of Chewelah, Washington, is being stockpiled for shipment to Trail, British Columbia, according to Owner E. J. Mullen of Chewelah. Plans call for re-opening the 30-year-old *Windfall* tunnel and extending it into the Mullen property to obtain 250 feet of depth.



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Iron Miners Receive DPA Tax Amortization Aid

Pickands Mather & Company, operating agents for a number of iron mining companies in Minnesota, has secured certificates of necessity for accelerated tax amortization on new or expanded facilities for the production of iron ore and concentrates. On the Cuyuna Range, the Cuyana Ore Company and the Youngstown Mines Corporation secured certificates. On the Mesabi Range the Lake Mining Company, Mahoning Ore and Steel Company, Utica Mining Company (two certificates), Vermillion Mining Company, Balkan Mining Company, Hoyt Mining Company, and Bennett Mining Company were granted certificates by the Defense Production Administration.

Certificates of necessity for accelerated tax amortization have been awarded to Cleveland-Cliffs Iron Company for increasing production of iron ore and concentrate at Coleraine and Hibbing, Minnesota. Inter-State Iron Company has also secured certificates for its Grant mine at Buhl, Hill-Annex mine at Calumet, and the Columbia mine at Virginia. The Hanna Coal & Ore Corporation has received certificates for mines at Crosby and Nashwauk, Minnesota.

Michigan companies and mines who have secured tax amortization certificates include Oliver Iron Mining Company at Ironwood, Negaunee Mine Company at Ishpeming, Republic Steel Corporation at Ironwood, Youngstown Mines Corporation at Bessemer, Inland Steel Company at Crystal Falls, and the Verona Mining Company at Caspian.



A \$5,000 contract to explore for reserves of asbestos in Marinette county, Wisconsin, has been entered into between the government and industry. Under terms of the DMA contract, the government will contribute 90 percent or \$4,500 to the cost of the project, and the Star Mining Company of Madison, Wisconsin, the operator, the remaining amount. Stripping of the overburden by a bulldozer around a small outcrop containing chrysotile is now in progress on the Herriman farm about seven miles west of Nathan, Michigan. Maximum depth of excavation will be 20 feet in an area covering 80 square feet.

The Vinegar Hill Zinc Company, operating zinc-lead mines south of Shullsburg, Wisconsin, has received a certificate of necessity from the Defense Production Administration for increasing its facilities for production of zinc concentrate.

Roger V. Whitside, Duluth, Minn. is continuing diamond drilling on a reported copper discovery located 12 miles southeast of Ely, Minn., on the Vermilion range. The lands being ex-

plored are located in Lake county.

Conversion of a 70-ton electric furnace from side door charging to top charging is expected to increase Republic Steel Corporation's electric furnace steel production by an estimated 50,000 tons a year. Transformer capacity of the furnace, located at the South Chicago plant, will also be enlarged. Conversion should be completed in December.



International Minerals & Chemical Corporation will acquire between \$750,000 and \$800,000 in cash or current assets and about 2,500 acres of phosphate mining property, principally in the Rutherford Creek area in Maury county, Tennessee, as the result of a contract with shareholders of Hoover and Mason Phosphate Company. The latter firm has decided to dispose of its holdings because the company's phosphate deposits in the Mt. Pleasant area were exhausted, and management had decided against undertaking the building of a new plant in the Rutherford Creek area. The transaction will involve the exchange of about 40,000 shares of Internationals common stock.

Surface drilling at the Mascot, Tennessee property of American Zinc, Lead & Smelting Company, has revealed a larger ore body than originally anti-

cipated. About 1,000,000 tons of high-grade zinc concentrates have so far been indicated. Development work will take between 18 months and two years to bring the mine into production. The deposit is said to have a content of three to four percent zinc, which is a higher grade than the present ore being mined on the property.

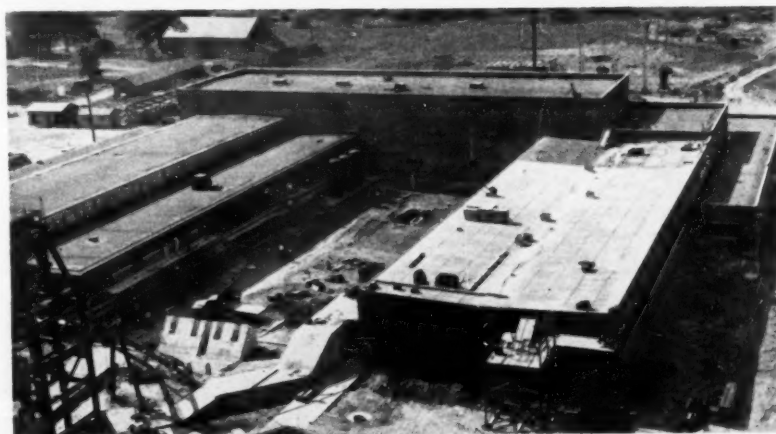
The Shook & Fletcher Supply Company has received three certificates of necessity for accelerated tax amortization covering expansion of iron ore producing plants at Russellville and Tait's Gap, Alabama.

Pyrrhotite concentrates to be recovered by flotation from the copper tailing from Vermont Copper Company's mine at South Strafford, Vermont will be converted into sulphur at a new \$500,000 plant to be erected by Brown Company, a large papermaking firm. This will be the first such operation in the United States, and the first to use iron pyrrhotite instead of iron pyrites as in Canada. From 27,000 tons of pyrrhotite concentrates a year, about 9,000 tons of sulphur is expected.

The New Jersey Zinc Company has received certificates of necessity from DPA for accelerated tax amortization. They cover plants for increased production of zinc at Palmerton, Pennsylvania and zinc ore at Friedensville, Pennsylvania.

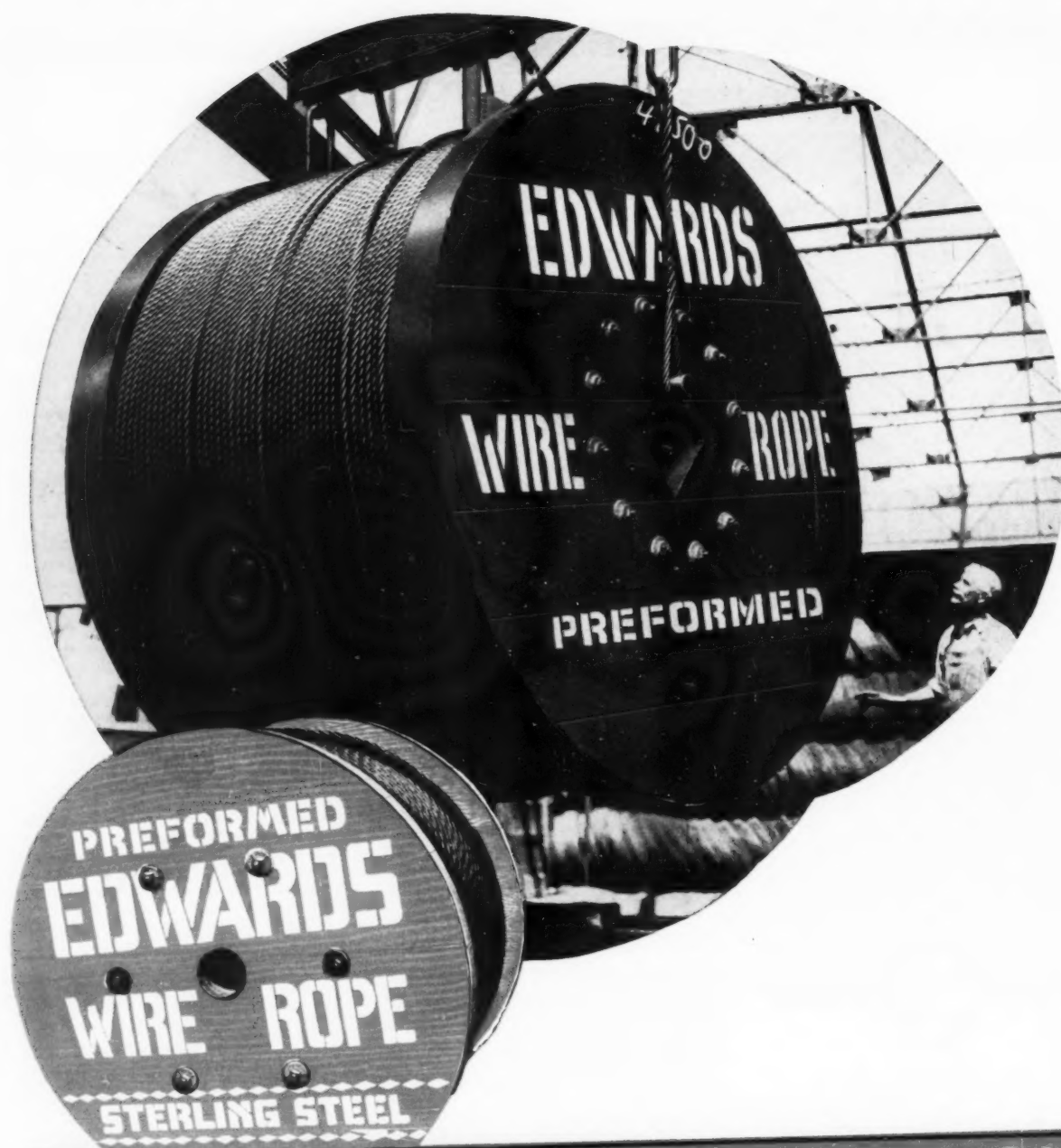
A new blast furnace to be erected at the Perry plant of Interlake Iron Company in Erie, Pennsylvania will increase annual output for producing pig iron at the plant from 181,000 net tons to 282,000 net tons.

Republic Steel Company will increase



NEW JERSEY ZINC'S UNDERGROUND MINE

New Jersey Zinc Company's mine development at Friedensville, Pennsylvania, is progressing rapidly. The surface buildings shown above will house hoisting equipment, shops, supply section, change house, dispensary, and offices, when completed. Later, construction of a mill building will be undertaken to house a modern flotation mill where zinc concentrates will be recovered. Along with surface building construction, steady sinking of the mine shaft is also progressing. The shaft has been sunk 850 feet, about two-thirds of its ultimate depth. Work on stations and crosscuts at various levels in the mine continues.



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MINING WORLD

its production of Alabama iron ore through the aid of rapid tax amortization granted by the Defense Production Administration. Certificates of necessity were granted for the Birmingham and Bessemer plants.



Snow and freezing weather on the Lake Superior Iron Ranges in early November reduced Lake shipments of ore to a trickle. Ice in the Duluth-Superior harbor presented only a small problem to vessel movement but the big delay was at the loading docks and 80 vessels were loading or waiting to load ore. Delay at the docks was caused by the long steaming process necessary to thaw the solidly frozen ore in the rail cars from the Minnesota mines. Total Lake shipments totaled 83,270,213 tons when the bad weather hit, compared to 71,761,248 tons for the same date in 1950.

A lease permitting ore prospecting of 1,531 acres of land in Township 29, Alpena county, was a feature of the sale of leases for iron ore lands of the state of Michigan. The Alpena county lands will be explored for the first time. The successful bidder was D. C. Slusser of Mt. Pleasant, Michigan. The Michigan state iron ore lease provides for an exploration period of three years under which the lessee is required to spend a minimum of \$10 per acre per year on exploration work. At the end of the exploration period, he is required to start mining, pay lieu royalty, or drop the lease.

At an estimated cost of \$4,000,000 *Hansand Steamship Company* plans to convert a former Government troop carrier into a 710-foot iron ore carrier for the Great Lakes district. The ship will be the property of Hansand, owned by *Hanna Coal & Ore Corporation*, a subsidiary of *The M. A. Hanna Company*; *Wheeling Steel Corporation*; and *Sand Products Corporation*.

The new screening plant which has been built at *Inter-State Iron Company's Hill-Annex mine* at Calumet, Minnesota during the past year is designed to handle 900 tons of crude ore per hour. The crude ore will come from the recently stripped northeast area, where the plant is located, and the stock-pile of cretaceous material which has accumulated at the property during the years of its operation; only a small amount of experimental tonnage of the cretaceous ore having been shipped.

Two large new bulk freighters are being built for the *Interlake Steamship Company*. One will be named the "Elton Hoyt II," in honor of the president of the steamship company who is also senior partner of *Pickands Mather & Company*. This vessel will become the flagship of the Interlake fleet. The other will be named the J. L. Mauthe, in honor of the president of *Youngstown Sheet & Tube Company*. The present "Elton Hoyt II," which has been in service since 1929, will be renamed the "Alex D. Chisholm" after *Pickands Mather's* resident partner in Duluth.

Bessemer and Lake Erie Railroad has ordered 500 new 70-ton ore cars with first deliveries scheduled for April 1952. This should substantially increase the flow of iron ore from the Mesabi Range in Minnesota to mills in the Pittsburgh district. The new cars will have a special

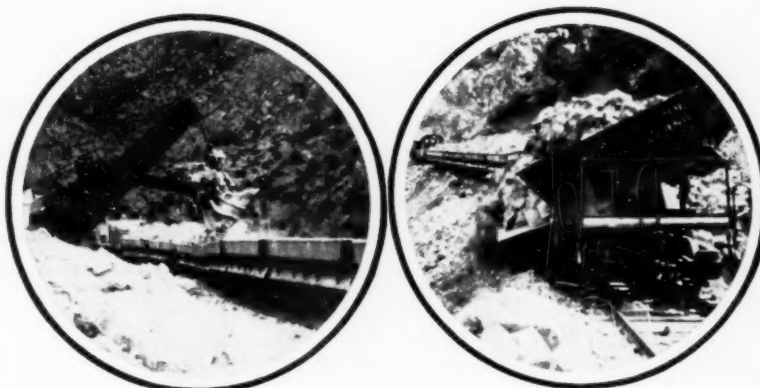
type of door in the bottom to facilitate unloading and will be equipped with steam holes in the sides for rapid defrosting of frozen ore.

With the discovery of new and large additions to Alberta's natural gas supply, the possibility of using gas in taconite beneficiation plants on the Mesabi range is being discussed. The 1,100-mile oil pipe line from Edmonton to Superior, Wisconsin has reached a maximum of 78,000 barrels in one day. It is said this can be increased to 100,000 barrels per day by the installation of intermediate pumping stations between the six stations already in operation.

The first of several C4-type, ocean-going vessels has been converted to a

Great Lakes freighter. Christened the *Tom M. Girdler* after the chairman of the board of *Republic Steel Corporation*, the ship is the property of the *Nicholson Universal Steamship Company* of Detroit, in which Republic owns a 70 percent interest. A new forward half of the ship was constructed. This section was floated to Baltimore where it was joined with the other half, the ship having been previously cut in two and the old bow section removed. This extensive conversion, undertaken at a cost of more than \$2,000,000, will provide a ship with an ore-carrying capacity of about 14,500 tons. The *Tom M. Girdler* is expected to make the round trip between Cleveland and Duluth in about 4½ days.

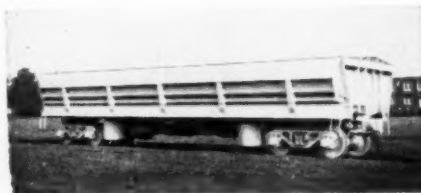
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California Zinc Property To Be Explored

The United States Government has agreed to share equally in the cost of exploratory drilling on the zinc properties of Glidden Company in Shasta county, California. The Government also will allow Glidden to use Government barges on the Shasta Lakes to move in the necessary drilling equipment.

Zinc, a strategic metal, has been in short supply for the past year and the Defense Minerals Administration, which signed the contract, has been anxious to increase domestic output.

Previous estimates indicated that the properties contain about 225,000 tons of zinc ore. If the exploratory drilling program confirms this estimate, underground mining operations will begin as soon as possible.

The ore mined will be moved by barges across the lakes to the Southern Pacific railway where it will be transported to a commercial smelter for refinement.

Iron Deposits Being Developed in Nevada

The production of iron ore from Nevada mines is receiving much attention in mining circles. Largest shipper at the moment is Simplot Iron Mines Inc. which is leasing the Modarelli property in the Cortez range, about 26 miles from Palisade, Eureka county. The properties are estimated to contain 30,000,000 tons of iron ore, and 20 to 30 carloads are being shipped daily to Oakland, California bound for steel mills in Japan. J. R. Simplot who heads the firm, says that construction of a steel plant in the Palisade area is possible, and that the construction of a railway spur to the open-pit operation is in the preliminary planning stage.

Near Lovelock, Nevada, Denton and associates are said to be shipping 1,000 tons daily, and in Coaldale the property of C. C. Boak is expected to yield 400,000 tons of ore under a five-year lease arrangement with an unidentified syndicate.

The New World Exploration, Research, and Development Corporation, headed by R. W. Van Deusen, has leased 104 square miles in the Cortez range and is surveying that area, while Utah Construction Company and several other large corporations are reported to be interested in deposits along French Creek.

There is little doubt that other areas in Nevada are being prospected, sampled, and, possibly, developed.

Two Firms Mine Uranium in Arizona Lukachukai Mts

Important production of uranium ore is being made by two concerns mining in the Lukachukai Mountain range of northeastern Arizona. Largest producer is the Navajo Uranium Company,

headed by R. O. Dulaney, Jr., of Cortez, Colorado. Its operation is five miles up the mountainside from Cove, a former Navajo Indian school, nestled between the mountain ranges 40 miles west of Shiprock, New Mexico. From Cove, the mining company with a bulldozer as its chief equipment, has cut 34 miles of truck trail along the different elevations of the Lukachukai ranges to reach the ore deposits. The mining crew consists of from 40 to 45 men, all but 5 of whom are Navajos. Truckers haul out from six to ten tons of ore per load. The company proposes to expand its force to about 100 and production to 3,000 tons monthly. At present the ore is hauled 150 miles to a government mill at Monticello, Utah. However, the company is building a sampling mill at Shiprock and plans to start stockpiling ore very shortly for a processing mill to be constructed there. G. R. Kennedy is manager, Ed Key, secretary-treasurer, and W. E. Jannaka, superintendent of mines.

The second company is Climax Uranium Company, which recently began operations not far from the Navajo Company. Its operations so far are about half the size of the Navajo Company concern, with a payroll estimated at \$3,000 monthly, compared with \$7,000 for the Navajo Company.

Reports indicate that the AEC spent an estimated \$500,000 exploring the Lukachukais before mining operations began. More than a dozen AEC employees are stationed at Cove, and three other camps are located on the reservation. Their principal activity is diamond drilling, and hundreds of holes have been drilled to prove the extent

of known deposits and to locate additional ones.

For the fiscal year ended June 30, 1951, royalties and leases enriched the Navajo Tribal Fund by more than \$151,000.



The *Summit* mine, operated by Arizona Metals Company, Kingman, Arizona, is shipping lead ore at the rate of 60 tons a week to the Midvale smelter. C. D. McGovern is mine superintendent.

Al Jagerson of Chloride, Arizona, has a small crew on development work at the *Evahom* mine. Principal metals are gold, silver, copper, lead, and zinc.

The old shaft and underground workings at the *Rebel* mine have been reopened by the owner, Frank L. Main, Prescott, Arizona, and production is under way. The property is located six miles southwest of Humboldt. Metal values are in gold, silver, lead, and zinc. Five men are employed under the direction of Bill Snyder, mine superintendent.

About 200 tons of ore have been shipped during the past month to the *Iron King* mill from the *Silver Flake* mine, five miles south of Prescott. Present work is conducted by Julian R. Sanchez of Prescott. It is understood that the operators propose to deepen the shaft from the 300- to the 400-foot level and to open a new working level.



NEW CARLSBAD POTASH OPERATION

One of two new companies entering the potash field around Carlsbad, New Mexico, is Southwest Potash Corporation, a subsidiary of American Metals Company, Ltd. The view above shows the new plant buildings currently under construction at a cost of \$7,000,000. The thickener tanks and muriate storage building can be seen.

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The Arizona Metals Company, Kingman, Arizona, shipped two cars of ore early in October from a new crosscut in the Summit mine, and additional shipments are being prepared. Further drifting along the vein is in progress. Ralph R. Langley is directing the work.

Nash Mines, headed by James P. Nash, Austin, Texas, is operating, under lease and option, a large group of claims near Patagonia, Arizona. Included in the group are the Kansas, Holland, Empire, Anne, Estella Louise, Maine, California, Smuggler, Bonanza, and Duquesne mines. Most of the production is coming from leasers working on a royalty basis, and all ore is milled at the American Smelting and Refining Company's Trench mill. Production from the various properties has been running at approximately 850 tons monthly and plans call for increasing the output to 1,000 tons monthly. D. C. Gilbert, Patagonia, is general manager. Ore values are in zinc with lead, copper and silver.

Oro Flame Mining Company, recently organized, is reopening the old Oro Flame mine near Prescott, Arizona. Several old workings are reported to have been reclaimed and 100,000 tons of ore is said to have been proved. Charles C. Samuels, formerly general manager of Sunshine Mining Company in Idaho, now holds the same position with Oro Flame.

The American Smelting and Refining Company is employing about 150 men and producing 150 tons of lead-zinc ore daily from its Flux mine, near Patagonia, Arizona. All ore is treated in the company's Trench mill, which also is handling custom ores from nearby properties. W. C. Waidler, Patagonia, is mine superintendent.

Exploration work has been started at the Compadre lead-zinc mine in Josephine Canyon, 18 miles northwest of Patagonia, Arizona. Verner Allen of San Francisco, California, is in charge.

Universal Minerals Recoveries, Wickenburg, Arizona, is erecting a new type of concentrator to handle the original Vulture mill tailings. The principal metal values are in lead and gold, and plans call for handling about 500 tons of tailings daily. Principals in the company are A. H. Goody and C. F. Wiksten.

N. T. Zuver, general manager of the Somind Consolidates Mines, near Salome, Arizona, expects to resume development work at the Eagle mine early in October. The property has been closed down for the summer.

The McFarland and Hullinger Operating Company, K. L. Erickson, manager, Bagdad, Arizona, is producing approximately 2,000 tons of zinc-copper monthly from the Old Dick mine. Twenty-five men are employed.

The Vanadium Corporation of America, operating the Monument No. 2 mine in Monument Valley, Arizona, is mining 2,000 tons of vanadium-uranium ore monthly. A crew of 83 men, 81 of whom are Navajo Indians, is employed. The ore is trucked 87 miles over tortuous desert trails to Shiprock, New Mexico, then 100 miles to the company's mill at Durango, Colorado. D. W. Viles, Durango, Colorado, is manager. R. L. Anderson is mine superintendent.

T. S. Sanford of Oracle, Arizona, is making occasional small shipments of high-grade copper ore from his lease on the Leatherwood property in the Old Hat mining district. The Leatherwood is part of the holdings of the Arizona Copper Mines, Inc.

F. L. Higgins, Box 84, Willcox, Ari-

zona, is sinking and drifting at the Senika mine, a group of 9 unpatented claims near Cochise Stronghold. He has increased his working crew from three to eleven men. Higgins purchased the claims in 1950 from the former owners who are said to have made substantial shipments

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of ore to the El Paso smelter. Principal metal values are in zinc, with small amounts of lead and silver.

Buildings at the *Control* mine in the Old Hat mining district near Oracle, Arizona, are being repaired by the *Arizona Copper Mines, Inc.*, in preparation for development work. Three men are employed under the direction of Louis Stickradt, mine superintendent, Box 44, Dos Cabezas, Arizona. J. E. Moewinkle of San Antonio, Texas, is president of the company.



Production has been resumed from underground deposits at the *New Idria* mine in the Hollister area of California. *New Idria Mining & Chemical Company* has two furnaces in operation.

The new mill of *Hazel Creek Mining Company* near Placerville, California, is treating 30 tons of ore daily. The ore body, developed 200 feet below the surface by a 400-foot tunnel, is said to vary in width from 20 to 25 feet. The property consists of 160 acres on the east belt of the Mother Lode.

Three scheelite ore bodies have been opened up at the surface of the *Tip Top* property near Bishop, California, operated by *Blue Ridge Gold Mines*.

A tungsten deposit located on the south slope of Newberry-Ord Mountains, California, is said to have been leased to *Allan Kiscock and Company* of New York. An adit at the *Shining Star* is being driven to intersect a scheelite bearing zone about 100 feet beneath its surface outcrop. The zone is reported to average about 10 feet wide and can be traced for several hundred feet.

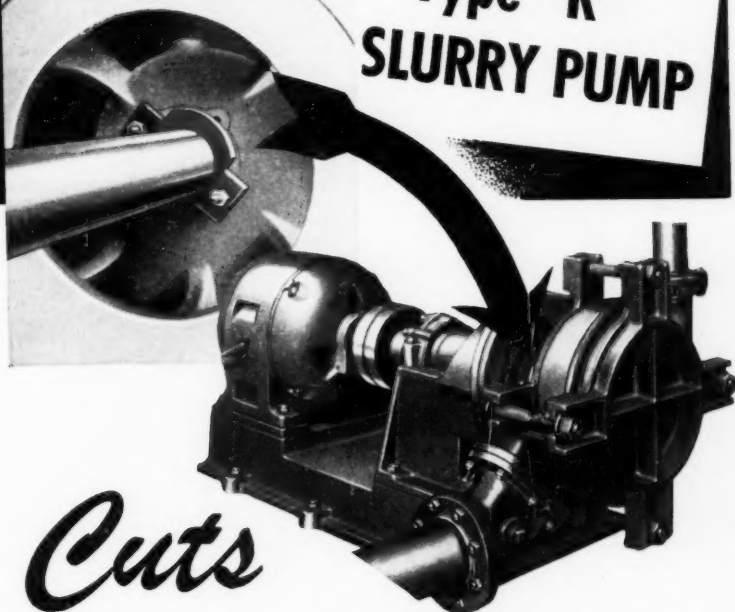
Yuba Consolidated Goldfields is re-dredging old property near Marysville, California, with giant dredges, some capable of digging to a depth of 124 feet below the water line and handling 350,000 cubic yards of gravel per month. Some virgin ground will be worked which has been uncovered by diverting the Yuba River from its main course.

The *Pacific Coast Borax Company* has been granted a 25 percent rapid tax amortization on facilities for the increased production of boron ores at its mines at Boron, California.

New facilities are being added to the *Johns-Manville Corporation's* plant and mine at Lompoc, California, to increase production of diatomite. A new calcining system with a rotary kiln 10 feet in diameter by 110 feet long is expected to increase mineral output by 40 percent over current levels.

Kaiser Magnesium Company, formed early this year as a subsidiary of *Kaiser Aluminum & Chemical Corporation*, is operating a reactivated plant at Manteca, California, for the government. The company has contracted to produce 20,000,000 pounds of magnesium a year. The government will take all of Manteca's output. The facilities were built by Kaiser during World War II and produced 25,000,000 pounds of metal in two years. Funds amounting to \$2,400,000 were made available for reactivating the plant and for providing greater output of the raw materials, ferrosilicon and dolomite, which come from the Kaiser plants at

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Lighthouse Mining and Milling Corporation is processing 50 tons of wolframite daily at its rebuilt concentrating plant in Barstow, California. Plant capacity will soon be increased to 100 tons daily. At present, all ore is trucked from the **Lighthouse** mine in the New York Mountains, 150 miles east of Barstow. The ore is reportedly found in lenses about 90 feet long and ranging from six inches to eight feet wide. Ore is stopped on the 140-foot level. Present equipment at the mill includes a 15 by 24 inch Taylor crusher, a ball mill, tables, hydraulic classifiers, three-belt magnetic separators, and a roaster. The Corporation also operates its own laboratory.



A new corporation to be known as **Haystack Mountain Development Company** has been formed by **The Atchison, Topeka and Santa Fe Railway Company** to mine uranium ore recently discovered on property owned by the Santa Fe near Grants, New Mexico. All of the stock of the new company is owned by the **Atchison, Topeka and Santa Fe Railway Company**. The offices will be located at Albuquerque, New Mexico, with Fred G. Gurley as president. The company is negotiating with **Anaconda Copper Com-**

pany for the sale and delivery of its ore when mined, and **Anaconda** is negotiating with the **Atomic Energy Commission** for permission to construct a mill for the processing of ore.

Graves and Gleason have made 11 shipments of uranium ore (carnotite) from their claims near Grants, New Mexico, to the **U.S. Atomic Energy Commission's** custom mill at Monticello, Utah. The ore, reportedly assayed at about 0.40 percent U_3O_8 , is the first shipped from the Grants district. The ore was mined from the Morrison formation, of younger age, and the Todilto limestone, the host rock of the original Grants discovery. The Morrison is the site of most of the Colorado Plateau ore deposits. In the Grants district, the Morrison ore has almost no radium and no vanadium, in contrast to Colorado Plateau ores where vanadium is about 10 times as plentiful as uranium.



Premier mine in Kings Canyon, Nevada, has been reopened by the **Canadian-American Tungsten Corporation** which has leased the property from the **Premier Mines Corporation of Nevada**. The company hopes to mine copper ore and to custom mill tungsten, now being mined at the **Hopi** claims south of Gardnersville. C. H. Hopkins will be mill superintendent. W. N. Awbrey of Gard-

nersville is president and general manager of Canadian-American.

Basic Refractories Inc. plans to construct a flotation plant to process magnesite ore near its new HMS plant at Gabbs, Nevada. Two new magnesite mines were recently opened by the company.

Shipments of gold-lead ore from the **Little Jupiter** mine in the Grass Valley district of Nevada are reportedly planned by **Sonoma Corporation of Oregon** which has leased the property from Lyle Bradley and associates.

Alpine Mining Company of Spokane has acquired a lead-zinc-silver property 55 miles southwest of Wells, Nevada, in the Ruby Mountain district and development work is under way. President John B. White reports. The firm has given Vancouver, B.C., and Toronto interests an option to purchase its **Noonday** mine near Sandon, B.C.

Conversion of the mill at Kinhead, Nevada to a tungsten concentrating plant is reported. **Dow Metals, Inc.** has taken over the plant and may design and construct a larger mill near Luning if the ore at Kinhead can be treated efficiently.

Daily shipments of 40 tons are being made by the **Black Rock Desert Mineral Company** from its sulphur mines in Sulphur, Nevada, 60 miles from Winnemucca. The material is being hauled three miles to a Western Pacific Railroad track for subsequent shipment to **Balfour-Guthrie Company** in San Francisco. Construction is being started on one additional milling unit. Owners of the company are Harold J. Adams of San Francisco and associates. General manager is Rex Zeek.

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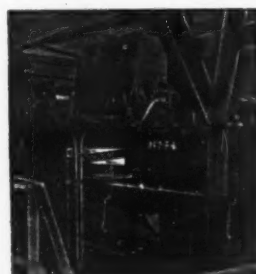
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Baboquinari's Golden Owls

Continued from Page 41

the clouds away to the north. Far below them lay the hacienda in the green fields of growing grain. While they rested, looking at the beautiful view below them, the sun sank behind the purple range and shadows fell on the mountain area.

Suddenly, the air was filled with hundreds of golden owls sailing off

into the distance. There were so many of them and they covered such a large territory it was impossible, in the growing darkness, to tell where they had come from.

Don Miguel and Pedro finally gave up the search and made their way down the ridge to a little tinaja where they camped for the night, intending to resume their exploration the next day. Don Miguel knelt and prayed that on the morrow he might be permitted to look upon the faces of the beautiful Indian princesses and the great piles of gleaming gold.


About sun-up the next morning the old Papago chief rode hurriedly into camp and asked if they had found the treasure. When the events of the preceding night were related,

he seemed greatly pleased.

He confessed to Don Miguel that after the secret of the cave had been told he became greatly alarmed and had followed them to the mountain by a different trail. He had remained on the ridge until daylight, when the owls had all gone to roost, then stopped the hole up with rocks and dirt.

"No more owls," said the old chief. "They will all die in the hole. Now no one will ever find the treasure."

To this day Indians go secretly to the mountain and place trinkets near the mouth of the cave to appease the wrath of the gods, but no one has found the treasure or looked on the faces and forms of the two beautiful little Indian princesses.



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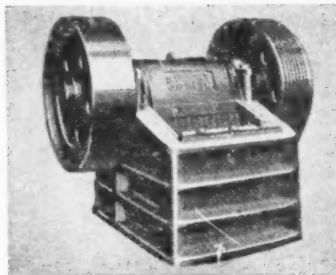
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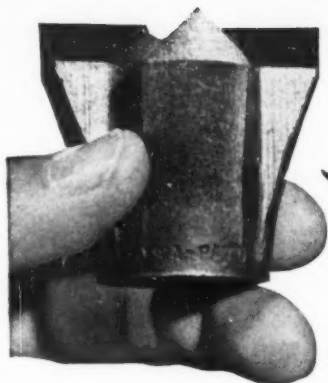
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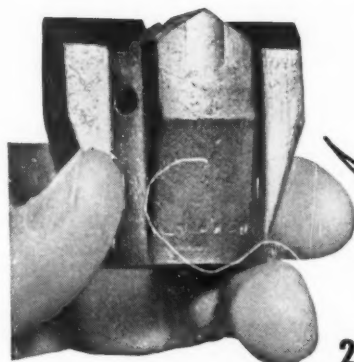
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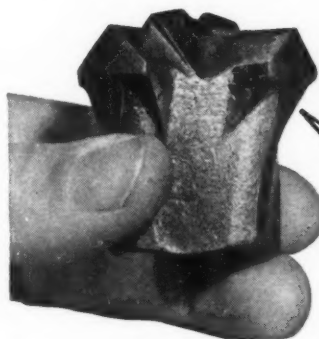
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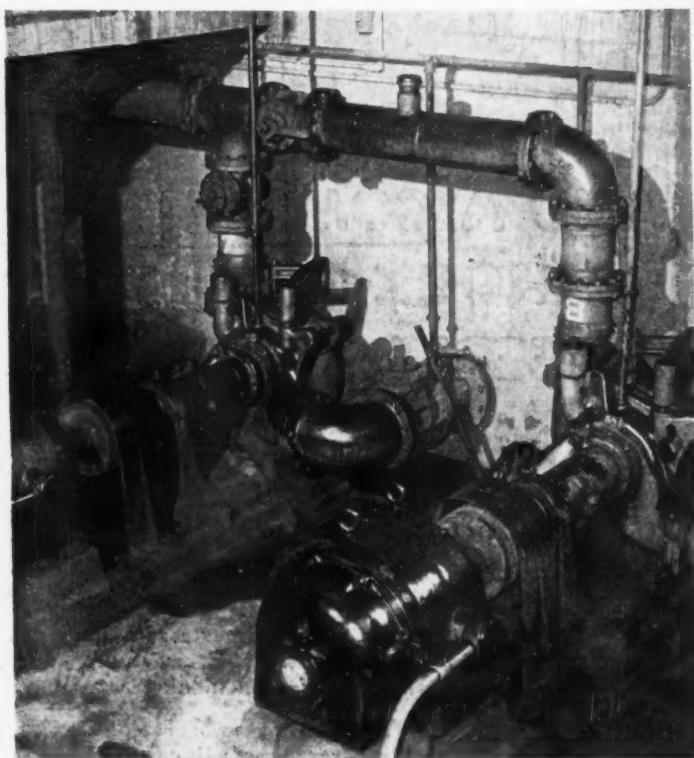
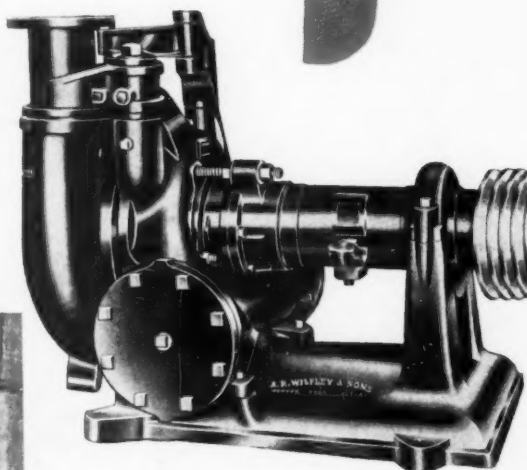
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